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IN THE U.S. PATENT AND TRADEMARK OFFICE

In re Application of: **Dabak**

Docket No.: **TI-29324**

Serial No.: **09/591,888**

Examiner: **D.J. Ryman**

Filed: **June 9, 2000**

Art Unit: **2665**

For: **IMPROVED RANDOM ACCESS PREAMBLE CODING FOR INITIATION OF WIRELESS MOBILE COMMUNICATION SESSIONS**

**APPEAL BRIEF TRANSMITTAL FORM**

June 8, 2005

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

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*Robert N. Rountree*

Robert N. Rountree, Reg. No. 39,347

Dear Sir:

Transmitted herewith in triplicate is Appellants' Brief in the above-identified application.

Charge the fee under 37 C.F.R. § 1.17(c) and any additional fees, or credit overpayment to the deposit account of Texas Instruments Incorporated, Account No. 20-0668. An original and two copies of this sheet are enclosed.

Respectfully submitted,

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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**APPELLANTS' BRIEF**

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*Robert N. Rountree*

Robert N. Rountree, Reg. No. 39,347

Dear Sir:

In support of their appeal of the Final Rejection of claims in the above-referenced application, Appellants respectfully submit herein their brief.

**1. REAL PARTY IN INTEREST**

Texas Instruments Incorporated is the real party in interest.

**2. RELATED APPEALS AND INTERFERENCES**

No other related appeals or interferences are known to Appellants.

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### **3. STATUS OF CLAIMS**

Claims 1, 5-20, 22-34, 47-50, and 52-56 are in the application. Claims 2-4, 21, 35-46, and 51 are cancelled without prejudice. Claims 25-34, 47-50, and 52-56 are added by amendment. Claims 1, 5-20, 22-34, 47-50, and 52-56 are rejected under 35 U.S.C. § 103(a). Examiner in an Office Action of November 4, 2004 made final rejection of claims 1, 5-20, 22-34, 47-50, and 52-56. Examiner reaffirmed the November 4, 2004 rejection in an Advisory Action dated February 16, 2005. Claims 1, 5-20, 22-34, 47-50, and 52-56 are on appeal and are reproduced in the Appendix to Appellants' Brief filed herewith.

### **4. STATUS OF AMENDMENTS**

No amendment was filed subsequent to final rejection.

### **5. SUMMARY OF CLAIMED SUBJECT MATTER**

Independent claim 1 is directed to a method of operating a wireless communications unit (UE) as shown at Figure 1 to request a connection with a base station (10) as described at page 8, line 13 through page 9, line 22. Referring to the flow chart at Figure 6 and described at page 19, line 6 through page 20, line 21, the method includes receiving a signal (74) from the base station (10) indicating at least one time slot within which a preamble may be transmitted by the wireless communications unit. The wireless communication unit (UE) selects one of a plurality of orthogonal codes (78) for the preamble and generates a spread code (80) using the selected orthogonal code repeated a selected number of repetitions. The spread code is multiplied by a scrambling code (82) associated with the base station. The length of the repeated spread code corresponds to a length of the scrambling code. A preamble corresponding to the multiplied spread code is transmitted to the base station (84).

Independent claim 11 is directed to a method of operating a base station (10) to recover a preamble code transmitted by a wireless unit (UE) as in Figure 1, described at page 20, line 22

through page 22, line 24. The method includes receiving a signal (86) corresponding to a preamble. The signal is arranged into a bitstream (page 20, lines 22-25) having a scrambling code with a length corresponding to a length of the preamble code. Bits from the bitstream are de-interleaved (88) and arranged into a plurality of groups ( $100_0$ - $100_{255}$ , Figure 7) corresponding to the plurality of repetitions of the spread code. The chip-rate demodulate and despread operations of the base station as shown at Figure 7 are described in detail at page 21, line 1 through page 23, line 25. The bits of the groups are despread ( $102_0$ - $102_{15}$ ) by removing the scrambling code to recover a plurality of symbol bits (90) in a sequence. The sequence has a length corresponding to the length of the preamble code. The sequence is correlated (94, Figure 6) (104, Figure 7) to identify a code corresponding to one of a set of orthogonal codes. In a preferred embodiment, the orthogonal codes are Walsh codes as shown at page 17.

Independent claim 20 is directed to a wireless communications unit (Figure 2) described in detail at page 9, line 23 through page 12, line 20. The wireless communication unit includes an antenna (A) for transmitting and receiving signals. A radio subsystem (22) is coupled to the antenna for amplifying and processing of signals transmitted and received at the antenna. RF interface circuitry (30) is coupled to the radio subsystem. The RF interface circuitry converts received signals into digital form and converts digital signals into a form transmittable over the antenna. A programmable digital circuit (32) performs digital operations upon signals to be transmitted and received. In particular, the programmable digital circuit performs the steps recited in independent claim 1.

Independent claim 23 is directed to a base station (10) for a wireless communications network as shown at Figure 3. The base station includes at least one base station antenna (BSA), for receiving and transmitting communications signals. A radio frequency interface circuit (44) is coupled to the antenna, for transmit and receive formatting and filtering signals received from or to be transmitted from the antenna. Baseband circuitry is coupled between the radio frequency interface circuitry and a telephone network to perform digital operations upon received data and data to be transmitted by the base station. The baseband circuitry includes circuitry (54) for encoding and modulating digital data received from the telephone network and to be transmitted

from the base station via the antenna, demodulating and despreading circuitry (48), for recovering a preamble code having a predetermined length and transmitted by a wireless unit, the preamble code including a scrambling code having the predetermined length. The chip-rate demodulate and despread operations of the base station as shown at Figure 7 are described in detail at page 21, line 1 through page 23, line 25. They include a sequence of delay lines (100<sub>0</sub>-100<sub>255</sub>) for receiving a bitstream including a plurality of bit symbols having the predetermined length corresponding to a received signal including the preamble code. A plurality of despreader functions (102<sub>0</sub>-102<sub>15</sub>) are coupled to a tap position in each of the sequence of delay lines, for receiving corresponding bits from corresponding positions in each of the delay lines, and for generating a bit of a symbol of the plurality of bit symbols. A code correlation function (104) compares the symbol presented by each of the plurality of despreader functions against a set of orthogonal codes and generates a signal indicating the correlation of the presented symbol with each of the orthogonal codes in the set.

Independent claim 25 is directed to a method of generating a preamble that may be transmitted by the wireless communications unit (UE) of independent claim 20. Referring to Figure 6 and page 19, line 6 through page 20, line 28, the method includes selecting a first code (78) from a plurality of orthogonal codes. The first code is repeated a plurality of times (80) to produce a spread code having a predetermined length. The spread code is multiplied by a second code (82) having the predetermined length.

Independent claim 30 is directed to a method of decoding a preamble as shown at Figure 7 and described at page 21, line 1 through page 23, line 25. The method includes detecting a scrambling code (98) in a received signal, the scrambling code having a predetermined length (4096). A first number (256) of repeated groups (100<sub>0</sub>-100<sub>255</sub>) of signals having a second number of signals (16) in each group is extracted from the received signal. One signal from each repeated group is applied to each respective despreader circuit (102<sub>0</sub>-102<sub>15</sub>) to produce a respective output signal. The second number of output signals is compared (104) to a plurality of codes.

Independent claim 47 is directed to a method of decoding a preamble from a remote transmitter as shown at Figure 7 and described at page 21, line 1 through page 23, line 25. The method includes receiving a first number (256) of repeated groups ( $100_0$ - $100_{255}$ ) of signals having a second number (16) of signals in each group from a received signal having a predetermined length (4096). The received signal includes a scrambling code having the predetermined length. The first number of repeated groups of signals are correlated (104) with a code having the second number of signals. The code corresponds to the remote transmitter.

## **6. GROUNDS FOR REJECTION TO BE REVIEWED ON APPEAL**

- A.** Independent claims 1, 20, and 25 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Appellants' admitted prior art in view of Scott et al. (U.S. Pat. No. 6,154,486) in further view of De Gaudenzi et al. (U.S. Pat. No. 6,466,566).
- B.** Independent claims 11 and 47 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Scott et al. (U.S. Pat. No. 6,154,486) in view of Miller (U.S. Pat. No. 5,608,722) in further view of De Gaudenzi et al. (U.S. Pat. No. 6,466,566).
- C.** Independent claim 23 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Scott et al. (U.S. Pat. No. 6,154,486) in view of Miller (U.S. Pat. No. 5,608,722) in further view of De Gaudenzi et al. (U.S. Pat. No. 6,466,566) in further view of Bottomley (U.S. Pat. No. 5,237,586).
- D.** Independent claim 30 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Miller (U.S. Pat. No. 5,608,722) in view of Scott et al. (U.S. Pat. No. 6,154,486) in further view of De Gaudenzi et al. (U.S. Pat. No. 6,466,566).

## 7. ARGUMENT

### A. Claims 1, 20, and 25

Independent claims 1 and 20 recite “selecting one of a plurality of orthogonal codes for the preamble; generating a spread code using the selected orthogonal code repeated a selected number of repetitions; multiplying the spread code by a scrambling code associated with the base station, wherein the spread code has a length corresponding to a length of the scrambling code.” Independent claim 25 recites “selecting a first code from a plurality of orthogonal codes; repeating the first code a plurality of times to produce a spread code having a predetermined length; and multiplying the spread code by a second code having the predetermined length.” Examiner states Scott et al. teach “having the spread code (preamble) be an orthogonal code repeated a selected number of repetitions.” Examiner further states De Gaudenzi et al. teach “that many practical systems make use of sequences composed of a unique internal sequence and an external sequence (col. 7, lines 30-40) where it is implicit that the internal sequence (spread code) is used to identify the mobile unit and the external sequence is used to identify the base station.” (Office Action 11/04/04, page 4, paragraph 8).

Regarding claims 1, 20, and 25, the primary issues are 1) whether the disclosures of Scott et al. and De Gaudenzi et al. are properly combinable and 2) if combined, whether they teach or suggest all the limitations of claims 1, 20, and 25. Examiner concedes that De Gaudenzi et al. “may be directed to a completely different purpose than the claimed invention.” (Office Action 11/4/04, page 2, paragraph 3). Examiner asserts that De Gaudenzi et al. is properly combinable with other cited prior art for three reasons. First, De Gaudenzi et al. is valid prior art. Appellants understands this to mean that De Gaudenzi et al. have an earlier priority date than the instant application. Second, De Gaudenzi et al. is directed to wireless communications, such that there is a nexus with the claimed invention. This, however, is irrelevant to whether De Gaudenzi et al. may be properly combined with Scott et al. under 35 U.S.C. § 103(a). The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in Appellants’ disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed.

Cir. 1991). (MPEP § 2143). Finally, Examiner states “the passages relied on in De Gaudenzi are directed to ‘practical systems.’ Thus, the passages cited in De Gaudenzi provide knowledge that is well known in the art.” Appellants respectfully submit that whether the teaching of De Gaudenzi et al. is practical or impractical is also irrelevant. There is no basis for Examiner’s combination of Scott et al. and with De Gaudenzi et al. apart from improper hindsight in view of the instant specification. “The references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention.” *Hodosh v. Block Drug Co., Inc.*, 786 F.2d 1136, 1143 n.5, 229 USPQ 182, 187 n.5 (Fed. Cir. 1986).

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. (MPEP § 2143). Appellants respectfully submit that examiner has failed to meet these criteria. Moreover, the examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the Examiner does not produce a *prima facie* case, the Appellants are under no obligation to submit evidence of nonobviousness. “To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.” *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). (MPEP § 2142). Examiner has failed to establish a *prima facie* case of obviousness. Thus, claims 1, 20, and 25 and their respective depending claims are patentable under 35 U.S.C. § 103(a) over Appellants’ admitted prior art in view of Scott et al. and further in view of De Gaudenzi et al.



## 1. SUGGESTION OR MOTIVATION TO COMBINE REFERENCES

Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. “The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art.” *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also *In re Lee*, 277 F.3d 1338, 1342-44, 61 USPQ2d 1430, 1433-34 (Fed. Cir. 2002) (discussing the importance of relying on objective evidence and making specific factual findings with respect to the motivation to combine references); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). (MPEP § 2143.01).

The disclosure of Scott et al. is directed to one primary issue. Scott et al. state “A preamble code may need to be identified rapidly, such as where a time slot is relatively short. This requirement generally suggests the use of short preamble codes.” At the same time, the preamble code must be resistant to noise, interference, multipath effects, and false alarms. Otherwise, if a preamble is not properly identified at the receiver, the entire message is lost. (col. 2, lines 42-51). Scott et al. disclose two problematic solutions to a short, noise resistant preamble code. First, Scott et al. teach that transmit power may be increased for the preamble. This solution, however, creates undue interference for other users in the same or neighboring frequency spectra and is, therefore, unacceptable. (col. 2, lines 52-65). Next, Scott et al. teach that lengthening the preamble code improves discrimination. This solution, however, is also rejected, because it requires more complex synchronization filters and more time to detect the lengthened preamble code. (col. 2, line 66-col. 3, line 3). Therefore, one of ordinary skill in the art at the time of the present invention must conclude from Scott et al. that a short, noise resistant preamble code is desirable and that increasing transmit power and increasing preamble code length are unacceptable solutions.

Neither Appellants' admitted prior art nor Scott et al. disclose the step of "multiplying the spread code by a scrambling code associated with the base station, wherein the spread code has a length corresponding to a length of the scrambling code" as required by claims 1 and 20 or "multiplying the spread code by a second code having the predetermined length" as required by claim 25. Examiner agrees. (Office Action 11/4/04, page 4, last paragraph). Examiner relies on De Gaudenzi et al. (col. 7, lines 30-40) to disclose this limitation. (Office Action 11/4/04, page 2, paragraph 2). However, Scott et al. specifically teach away from such a combination. If each repeated code of Scott et al. is multiplied by a long scrambling code, the result is a code equal to the length of the preamble. Scott et al. specifically reject this solution, because it requires more complex synchronization filters and more time to detect the lengthened preamble code. (col. 2, line 66 through col. 3, line 3). Thus, there is no teaching or suggestion by Scott et al. to suggest a combination with De Gaudenzi et al. to produce the present invention.

Scott et al. specifically state "In another aspect of the present invention, a repeated codeword preamble (RCP) code is formed by transmitting a single short codeword (i.e. subcode) several times in a row. At the receiver a relatively simple matched filter is used to generate a series of spikes separated by the period of the subcode." (col. 3, lines 58-62). One of ordinary skill in the art at the time of the invention would realize that such a simple matched filter could not possibly decode the RCP of Scott et al. if it were multiplied "by a scrambling code associated with the base station, wherein the spread code has a length corresponding to a length of the scrambling code" as required by claims 1 and 20 or "by a second code having the predetermined length" as required by claim 25. Such a multiplication would break the repetitive structure of the RCP that Scott et al. are proposing. Without this repetitive structure, the simplified decode structure envisioned by Scott et al. at the receiver is not possible. Therefore, the teaching of Scott et al. precludes a combination with De Gaudenzi et al.

Moreover, the disclosure of De Gaudenzi et al. is directed to interference cancellation without the need of a known training sequence such as a preamble. (col. 6, lines 16-21). This is a completely different purpose than the method of operating a wireless communications unit to request a connection with a base station or the method of generating a preamble as in claims 1,

20, and 25. Examiner concedes that De Gaudenzi et al. “may be directed to a completely different purpose than the claimed invention.” (Office Action 11/4/04, page 2, paragraph 3). By way of comparison, the present invention is directed to generating a preamble signal that is highly resistant to adverse Doppler effects. (page 9, lines 2-5). One of ordinary skill in the art at the time of the present invention would not find any suggestion by De Gaudenzi et al. to suggest a combination with Appellants’ admitted prior art or Scott et al. Therefore, such a combination can only be a result of Examiner’s improper hindsight in view of the instant specification.

Furthermore, if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). Here, the singular purpose of Scott et al. is to create a preamble code that may be identified rapidly, such as where a time slot is relatively short. This requires a short preamble code. Scott et al. specifically reject a long preamble code, because it requires more complex synchronization filters and more time to detect the lengthened preamble code. (col. 2, line 66-col. 3, line 3). Therefore, Examiner’s proposed modification of Scott et al. by combining with De Gaudenzi et al. would render the prior art invention of Scott et al. unsatisfactory for its intended purpose. Thus, there is no suggestion or motivation to make the proposed modification. For all the foregoing reasons, therefore, Appellants respectfully submit that claims 1, 20, and 25 and their respective depending claims are patentable under 35 U.S.C. § 103(a).

## 2. REASONABLE EXPECTATION OF SUCCESS

A *prima facie* obviousness case requires a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Here, a combination of Appellants’ admitted prior art, Scott et al. and De Gaudenzi et al. offers no chance of success. Scott et al. specifically teach away from such a combination. If each repeated code of Scott et al. is multiplied by a long scrambling code of De Gaudenzi et al., the result is a code equal to the length of the preamble. Scott et al. specifically reject this solution, because it requires more complex synchronization filters and more time to detect the lengthened preamble code. (col. 2, line 66-col. 3,

line 3). This is exactly the problem Scott et al. attempt to solve. Scott et al. state “A preamble code may need to be identified rapidly, such as where a time slot is relatively short. This requirement generally suggests the use of short preamble codes.” (col. 2, lines 42-51). Such a combination, therefore, is self-defeating. Thus, Appellants respectfully submit that claims 1, 20, and 25 and their respective depending claims are patentable under 35 U.S.C. § 103(a).

In an Advisory Action dated 2/16/05, Examiner either misunderstands or misrepresents Appellants’ position stated at page 13 of their response dated 1/24/05, and reproduced below.

Neither AAPA nor Scott et al. disclose the step of “multiplying the spread code by a scrambling code associated with the base station, wherein the spread code has a length corresponding to a length of the scrambling code” as required by claim 1. Examiner relies on De Gaudenzi et al. (col. 7, lines 30-40) to disclose this limitation. (OA 11/4/04, page 2, paragraph 2). However, Scott et al. specifically teach away from such a combination. If each repeated code of Scott et al. is multiplied by a long scrambling code, the result is a code equal to the length of the preamble. Scott et al. specifically reject this solution, because it requires more complex synchronization filters and more time to detect the lengthened preamble code. (col. 2, line 66-col. 3, line 3). Thus, there is no teaching or suggestion by Scott et al. to suggest a combination with De Gaudenzi et al. to produce the present invention. (Response 1/24/05, page 13).

By way of contrast, Examiner states “Thus, Scott teaches using a long code word comprising a repeated short code word precisely because a long code word formed in this manner does not require a long detection time.” (Advisory Action 2/16/05, page 2) Examiner has simply ignored multiplying the repeated code by a long scrambling code. It is this long scrambling code having the same length as the repeated code that Scott et al. specifically reject. Referring to Figure 5 of the present invention, for example, claim 1 recites “selecting one of a plurality of orthogonal codes ( $h_i$ ) for the preamble; generating a spread code using the selected orthogonal code repeated a selected number of repetitions (256); multiplying the spread code ( $h_i$  repeated 256 times) by a scrambling code ( $c_n$ ) associated with the base station, wherein the spread code has a length (4096) corresponding to a length of the scrambling code (4096).” Appellants respectfully reiterate Examiner either does not understand or misrepresents Appellants’ position as well as the claim limitations.

### 3. ALL CLAIM LIMITATIONS

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). “All words in a claim must be considered in judging the patentability of that claim against the prior art.” *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. § 103(a), then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). (MPEP § 2143.03).

Neither Appellants’ admitted prior art nor Scott et al. disclose the step of “multiplying the spread code by a scrambling code associated with the base station, wherein the spread code has a length corresponding to a length of the scrambling code” as required by independent claims 1 and 20. (emphasis added). Examiner relies on De Gaudenzi et al. (col. 7, lines 30-40) to disclose this limitation. (Office Action 11/4/04, page 2, paragraph 2). Therein, De Gaudenzi et al. state “In many practical systems (satellite or terrestrial), use is made of sequences composed of a unique internal sequence for each channel within a sector or beam (sequence Walsh-Hadamard or Gold) and an external sequence having the same timing and the same length as those of the internal sequence (pseudo-noise). Using a second slow external sequence with a pulse duration equal to the symbol duration permits to solve very large delay differences necessary for instance in case of combination of signals from different satellites. The length of this sequence is an integer multiple of the symbol duration.” De Gaudenzi et al. fail to disclose “a scrambling code associated with a base station” as required by claims 1 and 20. They only disclose the external sequence has the same timing and the same length as the internal sequence. A combination of Appellants’ admitted prior art, Scott et al. and De Gaudenzi et al., even though improper, fails to disclose all the limitations of claims 1 and 20. Thus, Appellants respectfully submit that claims 1, 20, and 25 are patentable under 35 U.S.C. § 103(a).

Claims 1 and 20 recite “generating a spread code using the selected orthogonal code repeated a selected number of repetitions; multiplying the spread code by a scrambling code associated with the base station, wherein the spread code has a length corresponding to a length

of the scrambling code.” Claim 25 recites “repeating the first code a plurality of times to produce a spread code having a predetermined length; and multiplying the spread code by a second code having the predetermined length.” Each of claims 1, 20, and 25, therefore, requires repeating a selected code (first code) to generate a spread code having a length. This spread code is then multiplied by a scrambling code (second code) having the same length. Scott et al. fail to disclose multiplying a repeated preamble code by anything. Examiner relies on De Gaudenzi et al. (col. 7, lines 30-40) to disclose this limitation. (Office Action 11/4/04, page 2, paragraph 2). Therein, De Gaudenzi et al. state “In many practical systems (satellite or terrestrial), use is made of sequences composed of *a unique internal sequence* for each channel within a sector or beam (sequence Walsh-Hadamard or Gold) and *an external sequence having the same timing and the same length* as those of the internal sequence (pseudo-noise). Using a second slow external sequence with a pulse duration equal to the symbol duration permits to solve very large delay differences necessary for instance in case of combination of signals from different satellites. The length of this sequence is an integer multiple of the symbol duration.” (emphasis added). This unique internal sequence of De Gaudenzi et al. cannot be taken as the spread code of claims 1, 20, and 25. The spread code is formed by repeating the selected code or first code. Thus, it is not a unique internal sequence as disclosed by De Gaudenzi et al. but a repeated sequence. Alternatively, if the unique internal sequence of De Gaudenzi et al. is taken as the selected code (claims 1 and 20) or first code (claim 25), then the external sequence of De Gaudenzi et al. cannot be the scrambling code or second code, because it does not have the same length as the repeated code or spread code. This limitation is not disclosed by a combination of Scott et al. with De Gaudenzi et al. or any other cited reference. Examiner does not even pretend it is disclosed. Examiner simply ignores this limitation of claims 1, 20, and 25 to maintain the present rejection. Thus, for all the foregoing reasons, Appellants respectfully submit that claims 1, 20, and 25 are patentable under 35 U.S.C. § 103(a).

Even if Scott et al. is combined with De Gaudenzi et al., the improper combination would not teach or suggest the invention of claims 1, 20, or 25 to one of ordinary skill in the art without improper hindsight in view of the present specification. Referring to Figure 5 of the present specification, for example, claim 1 recites “selecting one of a plurality of orthogonal codes ( $h_i$ )

for the preamble; generating a spread code ( $h_i h_i h_i \dots h_i$ ) using the selected orthogonal code repeated a selected number (256) of repetitions; multiplying the spread code by a scrambling code  $c_n (h_i h_i h_i \dots h_i)$  associated with the base station, wherein the spread code has a length (4096) corresponding to a length (4096) of the scrambling code.” Claims 20 and 25 include similar limitations. Thus, the exemplary preamble of claim 1 is a product of a 4096-chip scrambling code  $c_{4096}$  and 256 repeated 16-chip symbols  $h_{16}$ . The claimed sequence, therefore, has the form  $c_{4096} (h_{16} h_{16} h_{16} \dots h_{16})$  as shown in Figure 5. Scott et al. disclose a repeated code preamble, but teach away from multiplying it by anything. De Gaudenzi et al. teach a unique internal sequence for each channel and an external sequence having the same timing and the same length as those of the internal sequence. (col. 7, lines 30-40). Thus, at most, a combination of Scott et al. and De Gaudenzi et al. would produce a preamble having the form  $(co_{16}ci_{16} co_{16}ci_{16} \dots co_{16}ci_{16})$ , where  $co_{16}$  is the outer code and  $ci_{16}$  is the inner code. This is very different than the claimed preamble exemplified by Figure 5. Appellants respectfully submit that only Examiner’s improper hindsight in view of the instant specification suggests any similarity. One of ordinary skill in the art would find no teaching or suggestion in any of the cited references to produce the claimed invention. Thus, Appellants further submit that claim 1, 20, and 25 and their respective depending claims are patentable under 35 U.S.C. § 103(a).

## **B. Claims 11 and 47**

Independent claims 11 and 47 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Scott et al. (U.S. Pat. No. 6,154,486) in view of Miller (U.S. Pat. No. 5,608,722) in further view of De Gaudenzi et al. (U.S. Pat. No. 6,466,566). Claim 11 recites “receiving a signal corresponding to *a preamble*; arranging the signal into a bitstream having *a scrambling code with a length corresponding to a length of the preamble code*; de-interleaving bits from the bitstream, to group corresponding bits from each of a plurality of repetitions of a symbol length, into a plurality of groups; *despreading the bits of each of the plurality of groups to recover a plurality of symbol bits in a sequence*, the sequence having a length corresponding to the length of the preamble code; and correlating the sequence to identify a code, the code corresponding to one of a set of orthogonal codes.” Claim 47 recites “A method of decoding *a*

*preamble* from a remote transmitter, comprising the steps of: receiving *a first number of repeated groups of signals having a second number of signals in each group* from a received signal having a predetermined length, *the received signal comprising a scrambling code* having the predetermined length; and correlating the first number of repeated groups of signals with a code having the second number of signals, the code corresponding to the remote transmitter.” (emphasis added). Examiner relies on Scott et al. for their disclosure of a repeated codeword preamble (RCP). (col. 3, lines 58-60). Examiner further relies on De Gaudenzi et al. for their disclosure of internal and external sequences. (col. 7, lines 30-40). (Office Action 11/4/04, page 10, paragraph 21 and page 14, paragraph 26). Thus, Appellants reiterate all the foregoing arguments regarding claims 1, 20, and 25 for claims 11 and 47 and their respective depending claims.

Furthermore, claim 11 recites “receiving a signal corresponding to a preamble; arranging the signal into a bitstream having a scrambling code with a length corresponding to a length of the preamble code; de-interleaving bits from the bitstream, to group corresponding bits from each of a plurality of repetitions of a symbol length, into a plurality of groups.” Examiner relies on Miller (U.S. Pat. No. 5,608,722) for a disclosure of interleaving a bitstream and concludes de-interleaving is obvious in view of interleaving. However, Miller fails to disclose interleaving or de-interleaving a preamble as recited by claim 11. Thus, Appellants further submit that claims 11-19 are patentable under 35 U.S.C. § 103(a).

Regarding claim 47, Examiner relies on Miller to teach “that it is well known to spread a signal with an external PN sequence in order to properly identify the base station.” (Office Action 11/4/04 page 11, paragraph 21). Claim 47, however, is directed to a method of decoding a preamble. Miller is silent on preambles. Furthermore, Examiner fails to find any teaching or suggestion that Miller should be combined with any other cited reference.

Even if Miller is combined with Scott et al. and De Gaudenzi et al., the improper combination would not teach or suggest the invention of claim 47 to one of ordinary skill in the art without improper hindsight in view of the present specification. Referring to Figure 5 of the



present specification, for example, claim 47 recites “A method of decoding a preamble from a remote transmitter, comprising the steps of: receiving a first number (256) of repeated groups ( $h_i$ ) of signals having a second number (16) of signals in each group from a received signal having a predetermined length (4096), the received signal comprising a scrambling code ( $c_n$ ) having the predetermined length.” Thus, the exemplary preamble of claim 47 is a product of a 4096-chip scrambling code  $c_{4096}$  and 256 repeated 16-chip symbols  $h_{16}$ . The claimed sequence, therefore, has the form  $c_{4096}(h_{16} h_{16} h_{16} \dots h_{16})$  as shown in Figure 5. Scott et al. disclose a repeated code preamble, but teach away from multiplying it by anything. De Gaudenzi et al. teach a unique internal sequence for each channel and an external sequence having the same timing and the same length as those of the internal sequence. (col. 7, lines 30-40). Miller also teaches an internal code and external code. (col. 10, lines 52-65). Thus, at most, a combination of Scott et al., Miller, and De Gaudenzi et al. would produce a preamble having the form  $(co_{16}ci_{16} co_{16}ci_{16} \dots co_{16}ci_{16})$ , where  $co_{16}$  is the outer code and  $ci_{16}$  is the inner code. This is very different than the claimed preamble exemplified by Figure 5. Appellants respectfully submit that only Examiner’s improper hindsight in view of the instant specification suggests any similarity. Moreover, as previously discussed with respect to claims 1, 20, and 25, one of ordinary skill in the art would find no teaching or suggestion in any of the cited references to suggest such a combination. Thus, Appellants further submit that claim 47 and depending claims 48-56 are patentable under 35 U.S.C. § 103(a).

### C. Claim 23

Independent claim 23 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Scott et al. (U.S. Pat. No. 6,154,486) in view of Miller (U.S. Pat. No. 5,608,722) in further view of De Gaudenzi et al. (U.S. Pat. No. 6,466,566) in further view of Bottomley (U.S. Pat. No. 5,237,586). Claim 23 recites “demodulating and despreding circuitry, for recovering *a preamble code having a predetermined length* and transmitted by a wireless unit, *the preamble code including a scrambling code* having the predetermined length, comprising: a sequence of delay lines for receiving a bitstream including a plurality of bit symbols having the predetermined length corresponding to a received signal including the preamble code; a plurality of despreader

functions, each coupled to a tap position in each of the sequence of delay lines, for receiving corresponding bits from corresponding positions in each of the delay lines, and for generating a bit of a symbol of the plurality of bit symbols therefrom; and *a code correlation function, for comparing the symbol presented by each of the plurality of despreader functions against a set of orthogonal codes*, and for generating a signal indicating the correlation of the presented symbol with each of the orthogonal codes in the set.” (emphasis added). Claim 23, therefore, requires a preamble with a scrambling code having a predetermined length. The preamble includes a plurality of repeated bit symbols from which a single bit symbol is generated and compared to a set of orthogonal codes. These limitations are found in claims 1, 20, and 25. Thus, Appellants reiterate all the foregoing arguments regarding claims 1, 20, and 25 for claim 23 and respective depending claims.

Furthermore, Examiner concedes a combination of Scott et al. in view of Miller in further view of De Gaudenzi et al. “does not expressly disclose that the de-interleaving step comprises: applying the bitstream into a sequence of tapped delay lines; and grouping corresponding taps from each of the tapped delay lines.” (Office Action 11/4/04 page 17, paragraph 36). Examiner relies on Bottomley (U.S. Pat. No. 5,237,586) to disclose these limitations. Bottomley, however, discloses a RAKE receiver for combining multipath signals from a remote transmitter. The disclosure of Bottomley has nothing to do with a de-interleaving a preamble having a repeated code sequence. Thus, adding Bottomley to the existing improper combination of Scott et al., Miller, and De Gaudenzi et al. would leave one of ordinary skill in the art in a state of total confusion apart from the instant specification. There is no teaching or suggestion by any of the cited references or by Examiner to suggest an advantage in combining any two cited references and certainly not all four. Thus, Appellants respectfully submit that claims 23-24 are patentable under 35 U.S.C. § 103(a).

#### **D. Claim 30**

Independent claim 30 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Miller (U.S. Pat. No. 5,608,722) in view of Scott et al. (U.S. Pat. No. 6,154,486) in further view of De Gaudenzi et al. (U.S. Pat. No. 6,466,566). Claim 30 recites “*detecting a scrambling code in a*

*received signal, the scrambling code having a predetermined length; extracting a first number of repeated groups of signals having a second number of signals in each group from the received signal; applying one signal from each repeated group to each respective despreaders circuit of the second number of despreaders circuits, each despreaders circuit producing a respective output signal; and comparing the second number of output signals to a plurality of codes.”* Claim 30, therefore, requires a received signal with a scrambling code having a predetermined length. The received signal also includes a first number of repeated signals. These limitations are substantially the same as in claims 1, 20, and 25 except that a preamble is not explicitly recited. Thus, Appellants reiterate all the foregoing arguments regarding claims 1, 20, and 25 for claim 30 and respective depending claims.

Furthermore, as previously stated with regard to claim 47 and the exemplary embodiment of Figure 5, the received signal of claim 30 is a product of a 4096-chip scrambling code  $c_{4096}$  and 256 repeated 16-chip symbols  $h_{16}$ . The claimed sequence, therefore, has the form  $c_{4096} (h_{16} h_{16} h_{16} \dots h_{16})$  as shown in Figure 5, where  $c_n$  is the scrambling code and  $h_i$  is one of the repeated groups of signals. Scott et al. disclose a repeated code preamble, but teach away from multiplying it by anything. De Gaudenzi et al. teach a unique internal sequence for each channel and an external sequence having the same timing and the same length as those of the internal sequence. (col. 7, lines 30-40). Miller also teaches an internal code and external code. (col. 10, lines 52-65). Thus, at most, a combination of Scott et al., Miller, and De Gaudenzi et al. would produce a preamble having the form  $(co_{16}ci_{16} co_{16}ci_{16} \dots co_{16}ci_{16})$ , where  $co_{16}$  is the outer code and  $ci_{16}$  is the inner code. This is very different than the claimed preamble exemplified by Figure 5. Appellants respectfully submit that only Examiner’s improper hindsight in view of the instant specification suggests any similarity. Moreover, one of ordinary skill in the art at the time of the invention would find no teaching or suggestion in any of the cited references to suggest such a combination. Thus, Appellants further submit that claim 30 and depending claims 31-34 are patentable under 35 U.S.C. § 103(a).

As previously stated, none of the references cited by Examiner disclose a preamble having a repeated code group combined with a scrambling code. Only Examiner’s improper

hindsight in view of the instant specification produces this combination. For all the foregoing reasons, no combination of the cited references teaches or suggests all claim limitations as required for *prima facie* obviousness. Moreover, none of the cited references even suggest the problem solved by the claimed invention. Thus, Appellants respectfully submit that claims 1, 5-20, 22-34, 47-50, and 52-56 are patentable under 35 U.S.C. § 103(a).

In view of the above, Appellants respectfully request favorable consideration of the appeal from Final Rejection in the above referenced application and its reversal.

Respectfully submitted,

A handwritten signature in cursive script, reading "Robert N. Rountree".

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## 8. APPENDIX

### CLAIMS ON APPEAL

1. A method of operating a wireless communications unit to request a connection with a base station, comprising the steps of:

receiving, from the base station, a signal indicating at least one time slot within which a preamble may be transmitted by the wireless communications unit;

selecting one of a plurality of orthogonal codes for the preamble;

generating a spread code using the selected orthogonal code repeated a selected number of repetitions;

multiplying the spread code by a scrambling code associated with the base station, wherein the spread code has a length corresponding to a length of the scrambling code; and

transmitting, to the base station, a preamble signal corresponding to the multiplied spread code.

5. The method of claim 4, wherein the set of Walsh Hadamard codes consists of the set of Walsh Hadamard codes having a length of sixteen;

wherein the generating step repeats a symbol of the Walsh Hadamard code 256 times; and wherein the length of the scrambling code is 4096 chips.

6. The method of claim 4, wherein the set of Walsh Hadamard codes consists of the set of Walsh Hadamard codes having a length of sixteen;

wherein the generating step repeats a symbol of the Walsh Hadamard code 240 times;

and wherein the length of the scrambling code is 3840 chips.

7. The method of claim 1, wherein the plurality of orthogonal codes corresponds to a set of Walsh Hadamard codes.

8. The method of claim 1, wherein the selecting step comprises executing a pseudo-random selection algorithm.
9. The method of claim 1, wherein the receiving step receives a signal indicating a plurality of time slots within which the preamble may be transmitted by the wireless communications unit; and further comprising:  
selecting one of the plurality of time slots for transmission of the preamble.
10. The method of claim 1, further comprising:  
operating a base station to process the transmitted preamble, comprising the steps of:  
receiving the transmitted preamble;  
de-interleaving bits from the spread code, to group corresponding bits from each of the repetitions of the symbol;  
despreading the grouped bits to recover a symbol;  
correlating the recovered symbol to identify the selected orthogonal code.
11. A method of operating a base station to recover a preamble code transmitted by a wireless unit, comprising the steps of:  
receiving a signal corresponding to a preamble;  
arranging the signal into a bitstream having a scrambling code with a length corresponding to a length of the preamble code;  
de-interleaving bits from the bitstream, to group corresponding bits from each of a plurality of repetitions of a symbol length, into a plurality of groups;  
despreading the bits of each of the plurality of groups to recover a plurality of symbol bits in a sequence, the sequence having a length corresponding to the length of the preamble code;  
and  
correlating the sequence to identify a code, the code corresponding to one of a set of orthogonal codes.

12. The method of claim 11, wherein the de-interleaving step comprises:  
applying the bitstream into a sequence of tapped delay lines; and  
grouping corresponding taps from each of the tapped delay lines.
13. The method of claim 11, further comprising:  
responsive to the correlating step identifying a code, initiating a connection with a  
wireless unit that transmitted the preamble.
14. The method of claim 11, wherein the number of groups generated by the de-interleaving  
step corresponds to the length of the preamble code times a number of segments in the bitstream;  
wherein the despreading step recovers the plurality of symbol bits into a sequence having  
a length corresponding to the length of the preamble code times the number of segments;  
and wherein the correlating step comprises:  
correlating each of the corresponding symbol bits from each of the plurality of segments  
to identify the code.
15. The method of claim 14, wherein the correlating step comprises summing the power of  
the corresponding symbol bits from each of the plurality of segments.
16. The method of claim 14, wherein the correlating step comprises deriving a difference  
value of the corresponding symbol bits from each of the plurality of segments.
17. The method of claim 14, wherein the number of segments is four, with each segment  
having sixty-four symbols.
18. The method of claim 14, wherein the number of segments is eight, with each segment  
having thirty-two symbols.

19. The method of claim 14, wherein the number of segments is two, with each segment having one hundred twenty-eight symbols.

20. A wireless communications unit, comprising:

an antenna for transmitting and receiving signals;

a radio subsystem coupled to the antenna for amplifying and processing of signals transmitted and received at the antenna;

circuitry, coupled to the radio subsystem, for converting received signals into digital form, and for converting digital signals into a form transmittable over the antenna;

a programmable digital circuit, for performing digital operations upon signals to be transmitted and received, the programmable digital circuit programmed to request a connection with a base station by performing operations comprising:

receiving, from the base station, a signal indicating at least one time slot within which a preamble may be transmitted by the wireless communications unit;

selecting one of a plurality of orthogonal codes for the preamble;

generating a spread code using the selected orthogonal code repeated a selected number of repetitions;

multiplying the spread code by a scrambling code associated with the base station, wherein the spread code has a length corresponding to a length of the scrambling code; and

transmitting, to the base station, a preamble signal corresponding to the multiplied spread code.

22. The unit of claim 20, wherein the plurality of orthogonal codes corresponds to a set of Walsh Hadamard codes.



23. A base station for a wireless communications network, comprising:
- at least one base station antenna, for receiving and transmitting communications signals;
  - radio frequency interface circuitry, coupled to the antenna, for transmit and receive formatting and filtering signals received from or to be transmitted from the antenna;
  - baseband circuitry, coupled between the radio frequency interface circuitry and a telephone network, for performing digital operations upon received data and data to be transmitted by the base station, the baseband circuitry comprising:
    - circuitry for encoding and modulating digital data received from the telephone network and to be transmitted from the base station via the antenna;
    - demodulating and despreading circuitry, for recovering a preamble code having a predetermined length and transmitted by a wireless unit, the preamble code including a scrambling code having the predetermined length, comprising:
      - a sequence of delay lines for receiving a bitstream including a plurality of bit symbols having the predetermined length corresponding to a received signal including the preamble code;
      - a plurality of despreader functions, each coupled to a tap position in each of the sequence of delay lines, for receiving corresponding bits from corresponding positions in each of the delay lines, and for generating a bit of a symbol of the plurality of bit symbols therefrom; and
      - a code correlation function, for comparing the symbol presented by each of the plurality of despreader functions against a set of orthogonal codes, and for generating a signal indicating the correlation of the presented symbol with each of the orthogonal codes in the set.
24. The base station of claim 23, wherein the plurality of orthogonal codes corresponds to a set of Walsh Hadamard codes.

25. A method of generating a preamble, comprising the steps of:  
selecting a first code from a plurality of orthogonal codes;  
repeating the first code a plurality of times to produce a spread code having a predetermined length; and  
multiplying the spread code by a second code having the predetermined length.
26. A method as in claim 25, wherein the orthogonal codes are Walsh Hadamard codes corresponding to users in a wireless cell.
27. A method as in claim 26, wherein the second code is a scrambling code corresponding to a wireless cell.
28. A method as in claim 25, wherein a product of the plurality of orthogonal codes and the plurality of times the first code is repeated is equal to the predetermined length.
29. A method as in claim 25, wherein plurality of orthogonal codes is 16, the plurality of times the first code is repeated is 256, and the predetermined length is 4096.
30. A method of decoding a preamble, comprising the steps of:  
detecting a scrambling code in a received signal, the scrambling code having a predetermined length;  
extracting a first number of repeated groups of signals having a second number of signals in each group from the received signal;  
applying one signal from each repeated group to each respective despreader circuit of the second number of despreader circuits, each despreader circuit producing a respective output signal; and  
comparing the second number of output signals to a plurality of codes.
31. A method as in claim 30, wherein a product of the first and second numbers is equal to the predetermined length.

32. A method as in claim 31, wherein the first number is 256, the second number is 16, and the predetermined length is 4096.
33. A method as in claim 30, wherein the plurality of codes are Walsh Hadamard codes.
34. A method as in claim 30, comprising producing a signal corresponding to a match between the second number of output signals and one of the plurality of codes.
47. A method of decoding a preamble from a remote transmitter, comprising the steps of:  
receiving a first number of repeated groups of signals having a second number of signals in each group from a received signal having a predetermined length, the received signal comprising a scrambling code having the predetermined length; and  
correlating the first number of repeated groups of signals with a code having the second number of signals, the code corresponding to the remote transmitter.
48. A method as in claim 47, wherein a product of the first and second numbers is equal to the predetermined length.
49. A method as in claim 48, wherein the first number is 256, the second number is 16, and the predetermined length is 4096.
50. A method as in claim 47, wherein the code is a Walsh Hadamard code.
52. A method as in claim 47, wherein the received signal is a preamble having the predetermined length transmitted from a wireless transmitter to a wireless receiver in a cell, and wherein one of the plurality of codes corresponds to the wireless transmitter, and wherein the scrambling code corresponds to the cell.

53. A method as in claim 52, wherein the code is a Walsh Hadamard code, and wherein the scrambling code is a part of a Gold code.

54. A method as in claim 47, wherein each group of the first number of groups is substantially identical.

55. A method as in claim 47, comprising despreading the first number of groups of signals, thereby producing a plurality of despread signals.

56. A method as in claim 55, comprising correlating the despread signals with the code having the second number of signals repeated the first number of times.

## 9. CITED CASES

- 1) *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).
- 2) *Hodosh v. Block Drug Co., Inc.*, 786 F.2d 1136, 1143 n.5, 229 USPQ 182, 187 n.5 (Fed. Cir. 1986).
- 3) *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985).
- 4) *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000).
- 5) *In re Lee*, 277 F.3d 1338, 1342-44, 61 USPQ2d 1430, 1433-34 (Fed. Cir. 2002).
- 6) *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).
- 7) *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).
- 8) *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).
- 9) *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).
- 10) *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).
- 11) *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

LEXSEE 947 F.2D 488

IN RE MARK A. VAECK, WIPA CHUNGJATUPORNCHAI and LEE MCINTOSH

No. 91-1120

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

947 F.2d 488; 1991 U.S. App. LEXIS 24846; 20 U.S.P.Q.2D (BNA) 1438

October 21, 1991, Decided

**PRIOR HISTORY:**  [\*\*1]  Appealed from: United States Patent and Trademark Office Board of Patent Appeals and Interferences.

**DISPOSITION:**

Affirmed in Part, Reversed in Part.

**LexisNexis(R) Headnotes**

**COUNSEL:**

Ian C. McLeod, Ian C. McLeod, P.C., of Okemos, Michigan, argued for Appellant.

Teddy S. Gron, Associate Solicitor, Office of the Solicitor, of Arlington, Virginia, argued for Appellee. With him on the brief were Fred E. McKelvey, Solicitor and Richard E. Schafer, Associate Solicitor.

**JUDGES:**

Rich, Archer, and Mayer, Circuit Judges.  Mayer, Circuit Judge, dissenting.

**OPINIONBY:**

RICH

**OPINION:**

[\*489] RICH, Circuit Judge

This appeal is from the September 12, 1990 decision of the Patent and Trademark Office (PTO) Board of Patent Appeals and Interferences (Board), affirming the examiner's rejection of claims 1-48 and 50-52 of

application Serial No. 07/021,405, filed March 4, 1987, titled "Hybrid Genes Incorporating a DNA Fragment Containing a Gene Coding for an Insecticidal Protein, Plasmids, Transformed Cyanobacteria Expressing Such Protein and Method for Use as a Biocontrol Agent" as unpatentable under 35 U.S.C. § 103, as well as the rejection of claims 1-48 and 50-51 under 35 U.S.C. § 112, first paragraph, for lack of enablement. We reverse the § 103 rejection. The § 112 rejection is affirmed in part [\*\*2] and reversed in part.

**BACKGROUND**

*A. The Invention*

The claimed invention is directed to the use of genetic engineering techniques n1 for production of proteins that are toxic to insects such as larvae of mosquitos and black flies. These swamp-dwelling pests are the source of numerous human health problems, including malaria. It is known that certain species of the naturally-occurring *Bacillus* genus of bacteria produce proteins ("endotoxins") that are toxic to these insects. Prior art methods of combatting the insects involved spreading or spraying crystalline spores of the insecticidal *Bacillus* proteins over swamps. The spores were environmentally unstable, however, and would often sink to the bottom of a swamp before being consumed, thus rendering this method prohibitively expensive. Hence the need for a lower-cost method of producing the insecticidal *Bacillus* proteins in high volume, with application in a more stable vehicle.

n1 Basic vocabulary and techniques for gene cloning and expression have been described in *In re O'Farrell*, 853 F.2d 894, 895-99, 7 U.S.P.Q.2D

(BNA) 1673, 1674-77 (Fed. Cir. 1988), and are not repeated here.

[\*\*3]

As described by appellants, the claimed subject matter meets this need by providing for the production of the insecticidal *Bacillus* proteins within host cyanobacteria. Although both cyanobacteria and bacteria are members of the procaryote n2 kingdom, the cyanobacteria (which in the past have been referred to as "blue-green algae") are unique among procaryotes in that the cyanobacteria are capable of oxygenic photosynthesis. The cyanobacteria grow on top of swamps where they are consumed by mosquitos and black flies. Thus, when *Bacillus* proteins are produced within [\*490] transformed n3 cyanobacterial hosts according to the claimed invention, the presence of the insecticide in the food of the targeted insects advantageously guarantees direct uptake by the insects.

n2 All living cells can be classified into one of two broad groups, procaryotes and eucaryotes. The procaryotes comprise organisms formed of cells that do not have a distinct nucleus; their DNA floats throughout the cellular cytoplasm. In contrast, the cells of eucaryotic organisms such as man, other animals, plants, protozoa, algae and yeast have a distinct nucleus wherein their DNA resides. [\*\*4]

n3 "Transformed" cyanobacteria are those that have successfully taken up the foreign *Bacillus* DNA such that the DNA information has become a permanent part of the host cyanobacteria, to be replicated as new cyanobacteria are generated.

More particularly, the subject matter of the application on appeal includes a chimeric (i.e., hybrid) gene comprising (1) a gene derived from a bacterium of the *Bacillus* genus whose product is an insecticidal protein, united with (2) a DNA promoter effective for expressing n4 the *Bacillus* gene in a host cyanobacterium, so as to produce the desired insecticidal protein.

N4 "Expression" of a gene refers to the production of the protein which the gene encodes; more specifically, it is the process of transferring information from a gene (which consists of DNA)

via messenger RNA to ribosomes where a specific protein is made.

The claims on appeal are 1-48 and 50-52, all claims remaining in the [\*\*5] application. Claim 1 reads:

1. A chimeric gene capable of being expressed in Cyanobacteria cells comprising:
  - (a) a DNA fragment comprising a promoter region which is effective for expression of a DNA fragment in a Cyanobacterium; and
  - (b) at least one DNA fragment coding for an insecticidally active protein produced by a *Bacillus* strain, or coding for an insecticidally active truncated form of the above protein or coding for a protein having substantial sequence homology to the active protein,

the DNA fragments being linked so that the gene is expressed.

Claims 2-15, which depend from claim 1, recite preferred *Bacillus* species, promoters, and selectable markers. n5 Independent claim 16 and claims 17-31 which depend therefrom are directed to a hybrid plasmid vector which includes the chimeric gene of claim 1. Claim 32 recites a bacterial strain. Independent claim 33 and claims 34-48 which depend therefrom recite a cyanobacterium which expresses the chimeric gene of claim 1. Claims 50-51 recite an insecticidal composition. Claim 52 recites a particular plasmid that appellants have deposited.

n5 In the context of the claimed invention, "selectable markers" or "marker genes" refer to antibiotic-resistance conferring DNA fragments, attached to the gene being expressed, which facilitate the selection of successfully transformed cyanobacteria.

[\*\*6]

#### B. Appellants' Disclosure

In addition to describing the claimed invention in generic terms, appellants' specification discloses two particular species of *Bacillus* (*B. thuringiensis*, *B. sphaericus*) as sources of insecticidal protein; and nine genera of cyanobacteria (*Synechocystis*, *Anacystis*, *Synechococcus*, *Agmenellum*, *Aphanocapsa*, *Gloeocapsa*, *Nostoc*, *Anabaena* and *Ffremyllia*) as useful hosts.

The working examples relevant to the claims on appeal detail the transformation of a single strain of cyanobacteria, i.e., *Synechocystis* 6803. In one example, *Synechocystis* 6803 cells are transformed with a plasmid comprising (1) a gene encoding a particular insecticidal protein ("B.t. 8") from *Bacillus thuringiensis* var. *israelensis*, linked to (2) a particular promoter, the P[L] promoter from the bacteriophage Lambda (a virus of *E. coli*). In another example, a different promoter, i.e., the *Synechocystis* 6803 promoter for the rubisco operon, is utilized instead of the Lambda P[L] promoter.

### C. The Prior Art

A total of eleven prior art references were cited and applied, in various combinations, against the claims on appeal.

The focus of Dzelzkalns, n6 [\*\*7] the primary reference cited against all of the rejected claims, is to determine whether chloroplast promoter sequences can function in cyanobacteria. To that end Dzelzkalns discloses the expression in cyanobacteria of a chimeric gene comprising a chloroplast promoter [\*491] sequence fused to a gene encoding the enzyme chloramphenicol acetyl transferase (CAT). n7 Importantly, Dzelzkalns teaches the use of the CAT gene as a "marker" gene; this use of antibiotic resistance-conferring genes for selection purposes is a common technique in genetic engineering.

n6 12 *Nucleic Acids Res.* 8917 (1984).

n7 Chloramphenicol is an antibiotic; CAT is an enzyme which destroys chloramphenicol and thus imparts resistance thereto.

Sekar I, n8 Sekar II, n9 and Ganesan n10 collectively disclose expression of genes encoding certain *Bacillus* insecticidal proteins in the bacterial hosts *B. megaterium*, *B. subtilis* and *E. coli*.

n8 137 *Biochem. and Biophys. Res. Comm.* 748 (1986). [\*\*8]

n9 33 *Gene* 151 (1985).

n10 189 *Mol. Gen. Genet.* 181 (1983).

Friedberg n11 discloses the transformation of the cyanobacterium *Anacystis nidulans* R2 by a plasmid vector comprising the O[L]P[L] operator-promoter region and a temperature-sensitive repressor gene of the

bacteriophage Lambda. While the cyanobacteria are attractive organisms for the cloning of genes involved in photosynthesis, Friedberg states, problems may still be encountered such as suboptimal expression of the cloned gene, detrimental effects on cell growth of over-expressed, highly hydrophobic proteins, and rapid turnover of some gene products. To address these problems, Friedberg teaches the use of the disclosed Lambda regulatory signals in plasmid vehicles which, it states, have "considerable potential for use as vectors the expression of which can be controlled in *Anacystis* . . . ."

n11 203 *Mol. Gen. Genet.* 505 (1986).

Miller n12 compares [\*\*9] the initiation specificities *in vitro* of DNA-dependent RNA polymerases n13 purified from two different species of cyanobacteria (*Fremyella diplosiphon* and *Anacystis nidulans*), as well as from *E. coli*.

n12 140 *J. Bacteriology* 246 (1979).

n13 RNA polymerase, the enzyme responsible for making RNA from DNA, binds at specific nucleotide sequences (promoters) in front of genes in DNA, and then moves through the gene making an RNA molecule that includes the information contained in the gene. Initiation specificity is the ability of the RNA polymerase to initiate this process specifically at a site(s) on the DNA template.

Nierzwicki-Bauer n14 identifies in the cyanobacterium *Anabaena* 7120 the start site for transcription of the gene encoding *rbcL*, the large subunit of the enzyme ribulose-1,5-bisphosphate carboxylase. It reports that the nucleotide sequence 14-8 base pairs preceding the transcription start site "resembles a good *Escherichia coli* promoter," but that the sequence 35 base pairs before the [\*\*10] start site does not.

n14 81 *Proc. Natl. Acad. Sci. USA* 5961 (1984).

Chauvat n15 discloses host-vector systems for gene cloning in the cyanobacterium *Synechocystis* 6803, in which the antibiotic resistance-conferring *neo* gene is utilized as a selectable marker.

n15 204 *Mol. Gen. Genet.* 185 (1986).



Reiss n16 studies expression in *E. coli* of various proteins formed by fusion of certain foreign DNA sequences with the *neo* gene.

n16 30 *Gene* 211 (1984).

Kolowsky n17 discloses chimeric plasmids designed for transformation of the cyanobacterium *Synechococcus* R2, comprising an antibiotic-resistant gene linked to chromosomal DNA from the *Synechococcus* cyanobacterium.

n17 27 *Gene* 289 (1984).

[\*\*11]

Barnes, United States Patent No. 4,695,455, is directed to the treatment with stabilizing chemical reagents of pesticides produced by expression of heterologous genes (such as those encoding *Bacillus* proteins) in host microbial cells such as *Pseudomonas* bacteria. The host cells are killed by this treatment, but the resulting pesticidal compositions exhibit prolonged toxic activity when exposed to the environment of target pests.

#### [\*492] D. The Grounds of Rejection

##### 1. The § 103 Rejections

Claims 1-6, 16-21, 33-38, 47-48 and 52 (which include all independent claims in the application) were rejected as unpatentable under 35 U.S.C. § 103 based upon Dzelzkalns in view of Sekar I or Sekar II and Ganesan. The examiner stated that Dzelzkalns discloses a chimeric gene capable of being highly expressed in a cyanobacterium, said gene comprising a promoter region effective for expression in a cyanobacterium operably linked to a structural gene encoding CAT. The examiner acknowledged that the chimeric gene and transformed host of Dzelzkalns differ from the claimed invention in that the former's structural gene encodes CAT rather than insecticidally active protein. However, the examiner pointed [\*\*12] out, Sekar I, Sekar II, and Ganesan teach genes encoding insecticidally active proteins produced by *Bacillus*, and the advantages of expressing such genes in heterologous n18 hosts to obtain larger quantities of the protein. The examiner contended that it would have been obvious to one of ordinary skill in the art to substitute the *Bacillus* genes taught by Sekar I, Sekar II, and Ganesan for the CAT gene in the vectors of Dzelzkalns in order to obtain high level expression of the *Bacillus* genes in the transformed cyanobacteria. The examiner further contended that it would have been obvious to use

cyanobacteria as heterologous hosts for expression of the claimed genes due to the ability of cyanobacteria to serve as transformed hosts for the expression of heterologous genes. In the absence of evidence to the contrary, the examiner contended, the invention as a whole was *prima facie* obvious.

n18 Denotes different species or organism.

Additional rejections were entered against various groups of dependent claims [\*\*13] which we need not address here. All additional rejections were made in view of Dzelzkalns in combination with Sekar I, Sekar II, and Ganesan, and further in view of other references discussed in Part C above.

The Board affirmed the § 103 rejections, basically adopting the examiner's Answer as its opinion while adding a few comments. The legal conclusion of obviousness does not require absolute certainty, the Board added, but only a reasonable expectation of success, citing *In re O'Farrell*, 853 F.2d 894, 7 U.S.P.Q.2D (BNA) 1673 (Fed. Cir. 1988). In view of the disclosures of the prior art, the Board concluded, one of ordinary skill in the art would have been motivated by a reasonable expectation of success to make the substitution suggested by the examiner.

##### 2. The § 112 Rejection

The examiner also rejected claims 1-48 and 50-51 under 35 U.S.C. § 112, first paragraph, on the ground that the disclosure was enabling only for claims limited in accordance with the specification as filed. Citing *Manual of Patent Examining Procedure* (MPEP) provisions 706.03(n) n19 and (z) n20 as support, the examiner took the position that undue experimentation would be required of [\*\*14] the art worker to practice the claimed invention, in view of the unpredictability in the art, the breadth of the claims, the limited number of working examples and the limited guidance provided [\*493] in the specification. With respect to unpredictability, the examiner stated that

the cyanobacteria comprise a large and diverse group of photosynthetic bacteria including large numbers of species in some 150 different genera including *Synechocystis*, *Anacystis*, *Synechococcus*, *Agmenellum*, *Nostoc*, *Anabaena*, etc. The molecular biology of these organisms has only recently become the subject of intensive investigation and this work is limited to a few genera. Therefore the level of unpredictability regarding heterologous gene expression in

this large, diverse and relatively poorly studied group of procaryotes is high. . . .

n19 MPEP 706.03(n), "Correspondence of Claim and Disclosure," provides in part:

In chemical cases, a claim may be so broad as to not be supported by [the] disclosure, in which case it is rejected as unwarranted by the disclosure. . . .

n20 MPEP 706.03(z), "Undue Breadth," provides in part:

In applications directed to inventions in arts where the results are unpredictable, the disclosure of a single species usually does not provide an adequate basis to support generic claims. *In re Sol*, 1938 C.D. 723; 497 O.G. 546. This is because in arts such as chemistry it is not obvious from the disclosure of one species, what other species will work. *In re Dreshfield*, 1940 C.D. 351; 518 O.G. 255 gives this general rule: "It is well settled that in cases involving chemicals and chemical compounds, which differ radically in their properties it must appear in an applicant's specification either by the enumeration of a sufficient number of the members of a group or by other appropriate language, that the chemicals or chemical combinations included in the claims are capable of accomplishing the desired result." . . .

[\*\*15]

The Board affirmed, noting that "the limited guidance in the specification, considered in light of the relatively high degree of unpredictability in this particular art,

would not have enabled one having ordinary skill in the art to practice the broad scope of the claimed invention without undue experimentation. *In re Fisher*, 57 C.C.P.A. 1099, 427 F.2d 833, 166 U.S.P.Q. (BNA) 18 (CCPA 1970)."

## OPINION

### A. Obviousness

We first address whether the PTO erred in rejecting the claims on appeal as prima facie obvious within the meaning of 35 U.S.C. § 103. Obviousness is a legal question which this court independently reviews, though based upon underlying factual findings which we review under the clearly erroneous standard. *In re Woodruff*, 919 F.2d 1575, 1577, 16 U.S.P.Q.2D (BNA) 1934, 1935 (Fed. Cir. 1990).

Where claimed subject matter has been rejected as obvious in view of a combination of prior art references, a proper analysis under § 103 requires, *inter alia*, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art [\*\*16] that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success. *See In re Dow Chemical Co.*, 837 F.2d 469, 473, 5 U.S.P.Q.2D (BNA) 1529, 1531 (Fed. Cir. 1988). Both the suggestion and the reasonable expectation of success must be founded in the prior art, not in the applicant's disclosure. *Id.*

We agree with appellants that the PTO has not established the prima facie obviousness of the claimed subject matter. The prior art simply does not disclose or suggest the expression in cyanobacteria of a chimeric gene encoding an insecticidally active protein, or convey to those of ordinary skill a reasonable expectation of success in doing so. More particularly, there is no suggestion in Dzelzkalns, the primary reference cited against all claims, of substituting in the disclosed plasmid a structural gene encoding *Bacillus* insecticidal proteins for the CAT gene utilized for selection purposes. The expression of antibiotic resistance-conferring genes in cyanobacteria, without more, [\*\*17] does not render obvious the expression of unrelated genes in cyanobacteria for unrelated purposes.

The PTO argues that the substitution of insecticidal *Bacillus* genes for CAT marker genes in cyanobacteria is suggested by the secondary references Sekar I, Sekar II, and Ganesan, which collectively disclose expression of genes encoding *Bacillus* insecticidal proteins in two species of host *Bacillus* bacteria (*B. megaterium* and *B. subtilis*) as well as in the bacterium *E. coli*. While these references disclose expression of *Bacillus* genes encoding

insecticidal proteins in certain transformed *bacterial* hosts, nowhere do these references disclose or suggest expression of such genes in transformed *cyanobacterial* hosts.

To remedy this deficiency, the PTO emphasizes similarity between bacteria and cyanobacteria, namely, that these are both procaryotic organisms, and argues that this fact would suggest to those of ordinary skill the use of cyanobacteria as hosts for expression of the claimed chimeric genes. While it is true that bacteria and cyanobacteria are now both classified as procaryotes, that fact alone is not sufficient to motivate the art worker as the [\*\*18] PTO contends. [\*494] As the PTO concedes, cyanobacteria and bacteria are not identical; they are classified as two separate divisions of the kingdom Procaryotae. n21 Moreover, it is only in recent years that the biology of cyanobacteria has been clarified, as evidenced by references in the prior art to "blue-green algae." Such evidence of recent uncertainty regarding the biology of cyanobacteria tends to rebut, rather than support, the PTO's position that one would consider the cyanobacteria effectively interchangeable with bacteria as hosts for expression of the claimed gene.

n21 *Stedman's Medical Dictionary* 1139 (24th ed. 1982) (definition of "Procaryotae"). Procaryotic organisms are commonly classified according to the following taxonomic hierarchy: Kingdom; Division; Class; Order; Family; Genus; Species. 3 *Bergey's Manual of Systematic Bacteriology* 1601 (1989).

At oral argument the PTO referred to additional secondary references, not cited against any independent claim (i.e., Friedberg, Miller, and Nierzwicki-Bauer), [\*\*19] which it contended disclose certain amino acid sequence homology between bacteria and cyanobacteria. The PTO argued that such homology is a further suggestion to one of ordinary skill to attempt the claimed invention. We disagree. As with the Dzelzkalns, Sekar I, Sekar II, and Ganesan references discussed above, none of these additional references disclose or suggest that cyanobacteria could serve as hosts for expression of genes encoding *Bacillus* insecticidal proteins. In fact, these additional references suggest as much about *differences* between cyanobacteria and bacteria as they do about similarities. For example, Nierzwicki-Bauer reports that a certain nucleotide sequence (i.e., the -10 consensus sequence) in a particular cyanobacterium resembles an *E. coli* promoter, but that another nearby nucleotide sequence (the -35 region) does not. While Miller speaks of certain promoters of the bacteriophage Lambda that are recognized by both cyanobacterial and *E. coli* RNA

polymerases, it also discloses that these promoters exhibited differing strengths when exposed to the different polymerases. Differing sensitivities of the respective polymerases to an inhibitor are also [\*\*20] disclosed, suggesting differences in the structures of the initiation complexes.

The PTO asks us to agree that the prior art would lead those of ordinary skill to conclude that cyanobacteria are attractive hosts for expression of any and all heterologous genes. Again, we can not. The relevant prior art does indicate that cyanobacteria are attractive hosts for expression of both native and heterologous *genes involved in photosynthesis* (not surprisingly, for the capability of undergoing oxygenic photosynthesis is what makes the cyanobacteria unique among procaryotes). However, these references do not suggest that cyanobacteria would be equally attractive hosts for expression of *unrelated* heterologous genes, such as the claimed genes encoding *Bacillus* insecticidal proteins.

In *O'Farrell*, this court affirmed an obviousness rejection of a claim to a method for producing a "predetermined protein in a stable form" in a transformed bacterial host. 853 F.2d at 895, 7 U.S.P.Q.2d at 1674. The cited references included a prior art publication (the Polisky reference) whose three authors included two of the three co-inventor-appellants. The main difference [\*\*21] between the prior art and the claim at issue was that in Polisky, the heterologous gene was a gene for ribosomal RNA, while the claimed invention substituted a gene coding for a predetermined protein. *Id.* at 901, 7 U.S.P.Q.2d at 1679. Although, as the appellants therein pointed out, the ribosomal RNA gene is not normally translated into protein, Polisky mentioned preliminary evidence that the transcript of the ribosomal RNA gene was translated into protein, and further predicted that if a gene coding for a protein were to be substituted, extensive translation might result. *Id.* We thus affirmed, explaining that

the prior art explicitly suggested the substitution that is the difference between the claimed invention and the prior art, and presented preliminary evidence suggesting that the [claimed] method could be used to make proteins.

.... [\*495] ... Polisky contained detailed enabling methodology for practicing the claimed invention, a suggestion to modify the prior art to practice the claimed invention, and evidence suggesting that it would be successful.

*Id.* at 901-02, 7 U.S.P.Q.2d at 1679-80.

In contrast with the situation [\*\*22] in *O'Farrell*, the prior art in this case offers no suggestion, explicit or implicit, of the substitution that is the difference between the claimed invention and the prior art. Moreover, the "reasonable expectation of success" that was present in *O'Farrell* is not present here. Accordingly, we reverse the § 103 rejections.

#### B. Enablement

The first paragraph of 35 U.S.C. § 112 requires, *inter alia*, that the specification of a patent enable any person skilled in the art to which it pertains to make and use the claimed invention. Although the statute does not say so, enablement requires that the specification teach those in the art to make and use the invention without "undue experimentation." *In re Wands*, 858 F.2d 731, 737, 8 U.S.P.Q.2D (BNA) 1400, 1404 (Fed. Cir. 1988). That some experimentation may be required is not fatal; the issue is whether the amount of experimentation required is "undue." *Id.* at 736-37, 8 U.S.P.Q.2d at 1404. Enablement, like obviousness, is a question of law which we independently review, although based upon underlying factual findings which we review for clear error. *See id.* at 735, 8 U.S.P.Q.2d at 1402. [\*\*23]

In response to the § 112 rejection, appellants assert that their invention is "pioneering," and that this should entitle them to claims of broad scope. Narrower claims would provide no real protection, appellants argue, because the level of skill in this art is so high, art workers could easily avoid the claims. Given the disclosure in their specification, appellants contend that any skilled microbiologist could construct vectors and transform many different cyanobacteria, using a variety of promoters and *Bacillus* DNA, and could easily determine whether or not the active *Bacillus* protein was successfully expressed by the cyanobacteria.

The PTO made no finding on whether the claimed invention is indeed "pioneering," and we need not address the issue here. With the exception of claims 47 and 48, the claims rejected under § 112 are not limited to any particular genus or species of cyanobacteria. The PTO's position is that the cyanobacteria are a diverse and relatively poorly studied group of organisms, comprising some 150 different genera, and that heterologous gene expression in cyanobacteria is "unpredictable." Appellants have not effectively disputed these assertions. Moreover, [\*\*24] we note that only one particular species of cyanobacteria is employed in the working examples of appellants' specification, and only nine genera of cyanobacteria are mentioned in the entire document.

Taking into account the relatively incomplete understanding of the biology of cyanobacteria as of appellants' filing date, as well as the limited disclosure by appellants of particular cyanobacterial genera operative in the claimed invention, we are not persuaded that the PTO erred in rejecting claims 1-46 and 50-51 under § 112, first paragraph. There is no reasonable correlation between the narrow disclosure in appellants' specification and the broad scope of protection sought in the claims encompassing gene expression in any and all cyanobacteria. *See In re Fisher*, 57 C.C.P.A. 1099, 427 F.2d 833, 839, 166 U.S.P.Q. (BNA) 18, 24 (CCPA 1970) (the first paragraph of § 112 requires that the scope of the claims must bear a reasonable correlation to the scope of the enablement provided by the specification). n22 Accordingly, [\*496] we affirm the § 112 rejection as to those claims.

n22 The enablement rejection in this case was not based upon a post-filing date state of the art, as in *In re Hogan*, 559 F.2d 595, 605-07, 194 U.S.P.Q. (BNA) 527, 536-38 (CCPA 1977). *See also United States Steel Corp. v. Phillips Petroleum Co.*, 865 F.2d 1247, 1251, 9 U.S.P.Q.2D (BNA) 1461, 1464 (Fed. Cir. 1989) (citing *Hogan*); *Hormone Research Found., Inc. v. Genentech, Inc.*, 904 F.2d 1558, 1568-69, 15 U.S.P.Q.2D (BNA) 1039, 1047-48 (Fed. Cir. 1990) (directing district court, on remand, to consider effect of *Hogan* and *United States Steel* on the enablement analysis of *Fisher*), *cert. dismissed*, U.S. , 111 S. Ct. 1434, 113 L. Ed. 2d 485, 59 U.S.L.W. 3687 (1991). We therefore do not consider the effect of *Hogan* and its progeny on *Fisher's* analysis of when an inventor should be allowed to "dominate the future patentable inventions of others." *Fisher*, 427 F.2d at 839, 166 U.S.P.Q. at 24.

[\*\*25]

In so doing we do *not* imply that patent applicants in art areas currently denominated as "unpredictable" must never be allowed generic claims encompassing more than the particular species disclosed in their specification. It is well settled that patent applicants are not required to disclose every species encompassed by their claims, even in an unpredictable art. *In re Angstadt*, 537 F.2d 498, 502-03, 190 U.S.P.Q. (BNA) 214, 218 (CCPA 1976). However, there must be sufficient disclosure, either through illustrative examples or terminology, n23 to teach those of ordinary skill how to make and how to use the invention as broadly as it is claimed. This means that the disclosure must adequately guide the art worker to determine, without undue experimentation, which species

947 F.2d 488, \*, 1991 U.S. App. LEXIS 24846, \*\*;  
20 U.S.P.Q.2D (BNA) 1438

among all those encompassed by the claimed genus possess the disclosed utility. Where, as here, a claimed genus represents a diverse and relatively poorly understood group of microorganisms, the required level of disclosure will be greater than, for example, the disclosure of an invention involving a "predictable" factor such as a mechanical or electrical element. *See Fisher*, 427 F.2d at 839, 166 U.S.P.Q. at 24. [\*\*26] In this case, we agree with the PTO that appellants' limited disclosure does not enable one of ordinary skill to make and use the invention as now recited in claims 1-46 and 50-51 without undue experimentation.

n23 The first paragraph of § 112 requires nothing more than *objective* enablement. *In re Marzocchi*, 58 C.C.P.A. 1069, 439 F.2d 220, 223, 169 U.S.P.Q. (BNA) 367, 369 (CCPA 1971). How such a teaching is set forth, either by the use of illustrative examples or by broad terminology, is irrelevant. *Id.*

Remaining dependent claim 47 recites a cyanobacterium which expresses the chimeric gene of claim 1, wherein the cyanobacterium is selected from among the genera *Anacystis* and *Synechocystis*. Claim 48, which depends from claim 47, is limited to the cyanobacterium *Synechocystis* 6803. The PTO did not separately address these claims, nor indicate why they should be treated in the same manner as the claims encompassing all types of cyanobacteria. Although these claims are not limited to expression of [\*\*27] genes encoding particular *Bacillus* proteins, we note what appears to be an extensive understanding in the prior art of the numerous *Bacillus* proteins having toxicity to various insects. The rejection of claims 47-48 under § 112 will not be sustained.

#### CONCLUSION

The rejection of claims 1-48 and 50-52 under 35 U.S.C. § 103 is *reversed*. The rejection of claims 1-46 and 50-51 under 35 U.S.C. § 112, first paragraph, is *affirmed* and the rejection of claims 47 and 48 thereunder is *reversed*.

AFFIRMED-IN-PART, REVERSED-IN-PART.

#### DISSENTBY:

MAYER

#### DISSENT:

MAYER, Circuit Judge, dissenting.

An appeal is not a second opportunity to try a case or prosecute a patent application, and we should not allow parties to "undertake to retry the entire case on appeal." *Perini America, Inc. v. Paper Converting Machine Co.*, 832 F.2d 581, 584, 4 U.S.P.Q.2D (BNA) 1621, 1624 (Fed. Cir. 1987); *Eaton Corp. v. Appliance Valves Corp.*, 790 F.2d 874, 877, 229 U.S.P.Q. (BNA) 668, 671 (Fed. Cir. 1986). But that is precisely what the court has permitted here. The PTO conducted a thorough examination of the prior art surrounding this patent application and concluded the claims would [\*\*28] have been obvious. The board's decision based on the examiner's answer which comprehensively explains the rejection is persuasive and shows how the evidence supports the legal conclusion that the claims would have been obvious. Yet, the court ignores all this and conducts its own examination, if you will, as though the examiner and board did not exist. Even if I thought this opinion were more persuasive than the board's, I could [\*\*497] not join it because it misperceives the role of the court.

The scope and content of the prior art, the similarity between the prior art and the claims, the level of ordinary skill in the art, and what the prior art teaches are all questions of fact. *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 U.S.P.Q. (BNA) 459, 467, 15 L. Ed. 2d 545, 86 S. Ct. 684 (1966); *Jurgens v. McKasy*, 927 F.2d 1552, 1560, 18 U.S.P.Q.2D (BNA) 1031, 1037 (Fed. Cir. 1991). And "where there are two permissible views of the evidence, the factfinder's choice between them cannot be clearly erroneous." *Anderson v. City of Bessemer City*, 470 U.S. 564, 574, 84 L. Ed. 2d 518, 105 S. Ct. 1504 (1985). The mere denomination of obviousness as a question of law does not give the court license to decide [\*\*29] the factual matters afresh and ignore the requirement that they be respected unless clearly erroneous. *In re Woodruff*, 919 F.2d 1575, 1577, 16 U.S.P.Q.2D (BNA) 1934, 1935 (Fed. Cir. 1990); *In re Kulling*, 897 F.2d 1147, 1149, 14 U.S.P.Q.2D (BNA) 1056, 1057 (Fed. Cir. 1990). There may be more than one way to look at the prior art, but on this record we are bound by the PTO's interpretation of the evidence because it is not clearly erroneous and its conclusion is unassailable. I would affirm on that basis.

LEXSEE 786 F.2D 1136

**MILTON HODOSH AND RICHARDSON-VICKS, INC., Appellants, v. BLOCK  
DRUG COMPANY, INC., ET AL., Appellees**

**No. 85-2607**

**UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT**

**786 F.2d 1136; 1986 U.S. App. LEXIS 20042; 229 U.S.P.Q. (BNA) 182**

**March 24, 1986**

**PRIOR HISTORY: [\*\*1]**

Appealed from: U.S. District Court for the District of New Jersey. Judge Sarokin.

**DISPOSITION:**

Reversed and remanded.

**LexisNexis(R) Headnotes**

**COUNSEL:**

John O. Tramontine, Fish & Neave, of New York, New York, and Hugh A. Chapin, Kenyon & Kenyon, of New York, New York, argued, for Appellants. With them on the brief were W. Edward Bailey and Norman H. Beamer, of Fish & Neave and Paul Lempel and William J. McNichol Jr., of Kenyon & Kenyon.

Jerome G. Lee, Morgan, Finnegan, Pine, Foley & Lee, of New York, New York, argued, for Appellees. With him on the brief were William S. Feiler and Maria C.H. Lin, of Morgan, Finnegan, Pine, Foley & Lee, and Marvin C. Soffen and Edward A. Meilman, Ostrolenk, Faber, Gerb & Soffen.

**JUDGES:**

Rich, Davis, and Baldwin, Circuit Judges.

**OPINIONBY:**

RICH

**OPINION:**

[\*1137] RICH, Circuit Judge.

This appeal is from the July 12, 1985, judgment of the United States District Court for the District of New Jersey, 226 U.S.P.Q. (BNA) 645, granting summary judgment to Block Drug Company, Inc., et al. (Block) and holding that all six claims of patent No. 3,863,006 for "Method of Desensitizing Teeth" ('006 patent), issued to Dr. Milton Hodosh and licensed to Richardson-Vicks, [\*\*2] Inc. (collectively, Hodosh), are invalid for obviousness under 35 USC § 103. We reverse and remand.

*Background*

Tooth desensitizers reduce discomfort and pain caused by tooth hypersensitivity or exposed dentin, the portion of the tooth between the enamel and the pulp which includes a myriad of microscopic tubules. Persons suffering from this condition react painfully to hot or cold foods, citric acid or sweets, or everyday chemical, thermal, or tactile stimuli including toothbrush contact.

Milton Hodosh, a practicing dentist for about thirty years, independently developed the claimed subject matter of the '006 patent and granted Richardson-Vicks an exclusive license to make, use, and sell the claimed invention; the latter markets its tooth desensitizing toothpaste under the trademark "Denquel."

Claim 1 of the '006 patent n1 reads:

The method of desensitizing hypersensitive dentin and cementum by applying thereto an agent the essential ingredient of which is a nitrate of one of the following alkali metals: potassium, lithium or sodium said nitrate comprising between 1 percent and 20 percent by weight of said agent.

The remaining claims [\*\*3] appear in the opinion below.

n1 A certificate of reexamination confirming the patentability of claims 1-6 of the '006 patent was issued June 21, 1983, as a result of Hodosh's request for reexamination in 1982. Only one of the prior art references involved here, the Rosenthal patent, *infra*, was considered in the reexamination.

Appellee Block has, since 1961, marketed a tooth desensitizing toothpaste, covered by its patent No. 2,122,483 (the Rosenthal patent) for "Strontium Ion Toothpaste" issued in 1964, under the trademark "Sensodyne." The Rosenthal patent and the '006 patent disclose toothpaste formulae which are the same except that the latter contains, as a desensitizing agent, potassium nitrate instead of the Rosenthal-Block strontium chloride. After requesting and being denied a license under the '006 patent, Block developed its own potassium nitrate-containing tooth-desensitizing toothpaste called "Promise" and "Sensodyne-F." n2

n2 Block also initiated regulatory proceedings designed to delay or prevent Richardson-Vicks' marketing of "Denquel." Block, having allegedly failed to comply with Food and Drug Administration (FDA) procedures before marketing "Promise" and "Sensodyne-F" in competitive response to Richardson-Vicks' introduction of "Denquel," is currently defending itself in forfeiture proceedings initiated by the FDA.

[\*\*4]

March 30, 1983, Hodosh sued Block alleging that the sale of "Promise" and "Sensodyne-F" contributorily infringed and actively induced infringement of the '006 patent. Block answered and counterclaimed alleging patent misuse and consequent unenforceability of the '006 patent. On July 11, 1984, Block moved for summary judgment as to both misuse and patent invalidity. Oral argument was heard October 16, 1984, and decision was reserved. June 14, 1985, [\*1138] the reported decision was handed down granting the motion as to patent invalidity and dismissing the motion on misuse as moot, resulting in the judgment now on appeal.

The district court heard no expert testimony, but did hear arguments of counsel, receive briefs, review exhibits, and had before it declarations and affidavits from experts

on both sides commenting on the eight prior art references involved here, including the Rosenthal patent. The court determined that there were no genuine issues of material fact and concluded as a matter of law that the claims of the '006 patent were invalid under § 103 because the Rosenthal patent disclosed each element claimed in the '006 patent except the potassium nitrate, which, [\*\*5] in its view, was disclosed in two Chinese references, both based on ancient Chinese writings. The court also stated that six European references supported its conclusion of obviousness.

Because the appropriateness of summary judgment is determined on an analysis of the facts, *First National Bank of Arizona v. Cities Service Co.*, 391 U.S. 253, 20 L. Ed. 2d 569, 88 S. Ct. 1575 (1968), and because everything about these references, as a whole, *see, e.g., Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1138, 227 U.S.P.Q. (BNA) 543, 547-48 (Fed. Cir. 1985), is important to our determination, we review the record and lay out the relevant portions of the references in some detail.

#### A. The Chinese References

##### 1. The Grand Dictionary of Chinese Medicine and Drugs

##### (The Grand Dictionary)

The *Grand Dictionary*, published in Hong Kong in 1963 and written in Chinese, is based on ancient Chinese compilations assembled roughly 500 years ago from works of physicians going back 4000-5000 years. Only a portion of the 1963 Chinese text was before the court and is before us on appeal. For purposes of this litigation, that portion was translated [\*\*6] into English by Block's translator, Roger Wei-Ming Tsao (Mr. Cao). Mr. Cao is a doctor of Chinese medicine and a bilingual tutor. Block's other expert, Dr. Stephen Wei, a professor of dentistry fluent in Chinese, concurred in that translation. The writings from which the *Grand Dictionary* was compiled are not in evidence nor are any earlier writings.

In a nutshell, the district court relied upon the *Grand Dictionary* because of its discussion of "xiao shi" to which the *Grand Dictionary* associates the name "niter" and the chemical composition KNO<sub>3</sub> and the ability to cure, *inter alia*, tooth pain. The court's opinion was that this reference teaches the use of xiao shi, which is the same as niter and is therefore the same as potassium nitrate, to cure tooth pain; thus, the same as potassium nitrate, to cure tooth pain; thus, the teachings of the Rosenthal patent and the *Grand Dictionary* show that the '006 invention would have been obvious.

The following discussion and quotations are part of an attempt to convey the nature of the *Grand Dictionary*. The translated portion of the *Grand Dictionary* is entitled "Niter." The text under the first subheading

"Nomenclature" [\*\*7] reads: "It was so named because it has the power to consume various stones." Under "Other Names Stated in Classical Medical Books," the text reads "Mang Xiao (Bie-Lu), Bitter Xiao (Zhen-Quan), Flaming Xiao (Tu-Su) . . . and Xiao-Shi . . ." Thereafter, following "Foreign Names," the *Grand Dictionary* reads: "Salpetrae, Salnitri (in Latin); Niter (in English); and Salpoter (in German)." One page later "KNO[3]" is listed under "Chemical Composition."

The portion upon which Block and the district court rely to show that this substance cures tooth pain is headed "Collective Statements" and reads:

(Ming): Li-Shi-Zhen said: It cures summer infections and the catching of colds. It cures acute enteritis with severe vomiting, exertion through excessive sexual activity, black jaundice, chronic abdominal pain, conjunctivitis, headaches and tooth pain.

The next three or so pages of the *Grand Dictionary* list the ailments that this substance cures. An interesting but not atypical [\*1139] paragraph reads: "For curing the paralysis of the four limbs, leprosy or problems caused by Taoist stone eating." This substance also apparently cures indigestion, lack of energy, [\*\*8] typhoid, cataracts, and much, much more. The *Grand Dictionary* compares what appears to be various forms in which xiao shi is found, and the characteristics of each. An excerpt is:

Pu-Xiao (Na[2] So[4]) has the nature of water, tastes salty, and its flavor is cold. It can only descend and cannot ascend. It is Yin within Yin -- that's why it can cleanse the accumulation in the gastrointestinal tract and can expel the San-Jiao devilish fire. Whereas Niter (KNO[3]) has the nature of fire, tastes bitter and spicy, tastes slightly salty and has a flavor which is very warm, it's [sic] nature is ascending. It is fire within water. That's why it can break the accumulation and disperse hardness, and cure the febrile diseases.

## 2. Ben Cao Gang Mu

*Ben Cao Gang Mu* (*Ben Cao*) is a treatise on Chinese Medicine published in Hong Kong, in Chinese, in 1930, 1954, and 1965, but was originally written by Li-Shi-Zhen who lived during the Ming Dynasty. n3 Like the *Grand Dictionary*, only a portion of the Chinese text *Ben Cao* is in evidence and that portion was translated by Mr. Cao and Dr. Wei for purposes of this litigation. The district court relied [\*\*9] upon *Ben Cao* because it

discusses "xiao shi," which the translation of *Ben Cao* states is "niter" and associates the ability to cure "tooth pain (Ya Tong or Ya Teng)."

n3 The Ming Dynasty (1368-1644 AD) was marked by the restoration of traditional institutions in China and the development of the arts, especially in porcelain, textiles, and painting.

It is important to note, and the district court appeared to accept as fact, that the portion of the *Grand Dictionary* relied upon was compiled during the Ming Dynasty of the 13th to 15th centuries in *Ben Cao Gang Mu* so that the relevant portion of the *Grand Dictionary* is substantially a restatement of *Ben Cao* with some modification by an unidentified author. The court stated that these two references "quote the same Ming Dynasty source as labeling KNO[3] for tooth pain."

The *Ben Cao* translation is entitled "Xiao-Shi (Niter)" and refers to the same "Other names" for this substance listed in the *Grand Dictionary*. With respect to [\*\*10] the quoted sections above, the *Ben Cao* translation is nearly verbatim. It has this to say about tooth pain:

Da Ming states: It cures summer infections and the catching of colds, acute enteritis with severe vomiting, exertion through excessive sexual activity and black jaundice, chronic abdominal pain, conjunctivitis, headache and tooth pain (Ya-Tong or Ya Teng).

Hodosh argues that summary judgment was inappropriate; issues of fact as to the meanings of xiao shi and ya tong remain because a skilled dental researcher would surely seek and obtain a complete translation of the *Grand Dictionary* and of the other ancient Chinese references and would read those references carefully. Hodosh also argues that the ancient references should be dismissed because a person skilled in the art would find them incredible and would regard them as a quagmire of medical and dental nonsense. It therefore takes issue with the court's holding quoted below which apparently precluded inquiry into the accuracy of the references by one skilled in the art:

Attacks upon the translation leading up to the prior art reference embodied in the *Grand Dictionary of Chinese Medicine* [\*\*11] and *Drugs*, . . . or upon Chinese medicine as a whole, . . . are not here regarded as particularly pertinent, since they require skill beyond the scope of the



"experienced researcher in dental fields. . . ."

Hodosh relies heavily on its expert's, Dr. Shklar's, testimony about the Chinese references: "They represent in modern terms, materials that are rarely comprehensible and frequently contradictory in their literal terms. The materials are largely [\*1140] seen by contemporary medical scientists as absurd; no serious medical researcher would waste his or her time with them." n4 Hodosh also contests this holding by the district court:

Nor, if it is true that KNO[3] alleviates tooth sensitivity, is such reference in the prior art rebutted by the existence of errors in the reference such as, for example, the claim that KNO[3] is a cure for "exertion through excessive sexual activity." Whatever the merits of the other aspects of the Chinese references, the fact that they reveal KNO[3] to be a cure for ya tong is what is dispositive here. The reference clearly discloses such function of potassium nitrate, albeit in the context of otherwise incredible, [\*\*12] and even erroneous descriptions of the compound's quality.

n4 Dr. Shklar is the Charles A. Brackett Professor of Oral Pathology at the Harvard School of Dental Medicine, and is an acclaimed expert in dentistry. He is also an expert on the history of dentistry and holds membership in the American Academy of the History of Dentistry.

With respect to the specific meaning of xiao shi as used in these references, both Dr. Shklar and Hodosh's other expert, Mr. Yen, a professional translator of Chinese and English languages, stated that the compiler of the *Grand Dictionary* erred in associating potassium nitrate or niter with xiao shi. Mr. Yen states that he

was not able to render one single precise version because various dictionaries contain different and even conflicting definitions. For example, *Source of Words*, a Chinese language dictionary, published by Commercial Press, Taiwan, which has editions dating back to 1915, defines "Xiao-Shi" as "Mang-Xiao" on page 1255, and under "Mang-Xiao" [\*\*13] on page 1770, reference is made that "Mang-Xiao"

is "Liu-Suen-Na," and on page 1523 "Liu-Suen-Na" is defined as sodium sulfate (Na[2]SO[4]10H[2]O).

Mr. Yen also stated that "Xiao-Shi could be more than one material and that more than one material may be represented by the term 'Xiao-Shi'."

Dr. Shklar concurred:

In my opinion, therefore, the answer to the question: What was "Xiao-Shi," is that it represented many different materials which cannot be identified with certainty.

Thus, these Exhibits did not describe potassium nitrate to one skilled in the art any more than any of the hundreds of salts, ores and oxides that possess some of the enumerated properties.

In addition, Dr. Shklar stated: "It is insufficient to simply state, as the Block translator does, that 'Xiao-Shi' is 'niter,' and then cite a modern dictionary to 'establish' that 'niter' is potassium nitrate." With respect to both the *Grand Dictionary* and *Ben Cao*, he stated that "the translator appears to have inserted the term 'niter' into the text where the phrase 'consumer of stones' actually belongs."

Block's arguments, on the other hand, in part based on the short affidavit [\*\*14] by Mr. Wei, substantially follow the district court's opinion. Block also challenges the competence of Hodosh's experts stating that they "either had no knowledge or training in the Chinese language or Chinese medicine or were unfamiliar with dentistry or medicine generally." Block also emphasizes that the Chinese references correctly disclose many of potassium nitrate's characteristics, like burning with a violet flame, usability for making signal fires and gun powder, and its water solubility; these three properties of xiao shi in the Chinese references definitely confirm, according to Block, that xiao shi is potassium nitrate, KNO[3].

#### B. *The European Prior Art*

This art is contained in six references and was not relied upon to any significant degree by Block or the district court. Hodosh scarcely mentions it on appeal, instead preferring to show the existence of genuine issues of material fact with respect to the Chinese references. After concluding that using potassium nitrate to cure tooth pain would have been obvious from Rosenthal in [\*1141] view of the Chinese art, the court stated: "Such holding is strengthened by the European prior art which, while ambiguous [\*\*15] because of the several conflicting

definitions in the term 'niter,' at least suggest to one skilled in the art that potassium nitrate ought to be tried as a cure for tooth pain in general."

Block submitted no affidavits that addressed the substance of the European references. Hodosh's Dr. Shklar, on the other hand, stated why this art, part of the "humors, spirits and Alchemy of the Dark Ages" having whatever medicinal effect they did by virtue of their use of wine, opium, or other narcotic substances, would have been questioned by one skilled in the art. He specifically contends that Block's translation of "nitre" is erroneous: "it is common knowledge that these terms meant sodium carbonate and/or sodium carbonate-sodium bicarbonate mixture. . . ."

To afford a glimpse of the nature of these references, an interesting and typical excerpt, one quoted by the district court, based upon a statement by the long since deceased French surgeon Guy de Chauliac reads that "a mixture of 'cuttlebone, small white sea shells, pumice, burnt stag's horn, nitre, alum, rock salt, burnt roots of iris, aristolochia, and reeds' could create an effective dentifrice." (District court's emphasis. [\*\*16] ) Three of the European references are based on that statement. The district court noted the others:

Additionally, a 1693 treatise by the British Professor of Physics William Salmon states that nitrum "held in the Mouth . . . immediately helps the Toothach, if burnt and used in a Dentifrice, it cleanses and whitens the Teeth." . . . Similarly, a reference work by Hardianus a Mynsicht, translated into English in 1682, describes a mixture, including "nitre" as a "tincture for the toothache." . . . Finally, Pliny the Elder, in his *Historie of the World, The Second Tome*, translated into English in 1601, describes the use of nitre to "easeth the toothach, if the mouth and gums be washed therewith," or if burned, as a dentifrice. [Reference to Exhibits omitted.]

With this description of both the Chinese and European references, and of what they represent as a whole, in hand, we consider the proper application of the *Graham* standards and their effect upon the propriety of summary judgment in this case. See generally *Graham v. John Deere Co.*, 383 U.S. 1, 17, 86 S. Ct. 684, 15 L. Ed. 2d 545 (1966); *Panduit Corp. v. Dennison Manufacturing Co.*, 774 F.2d 1082, 227 U.S.P.Q. (BNA) 337 (Fed. Cir. 1985). [\*\*17]

#### OPINION

#### A. Summary Judgment

Summary judgment, in patent as in other cases, is appropriate where there is no genuine issue of material fact, and the movant is entitled to judgment as a matter of law. See *Molinaro v. Fannon/Courier Corp.*, 745 F.2d 651, 653-54, 223 U.S.P.Q. (BNA) 706, 707 (Fed. Cir. 1984). The movant bears the burden of demonstrating the absence of all genuine issues of material fact, and the district court must view the evidence in a light most favorable to the nonmoving party and draw all reasonable inferences in its favor. See *United States v. Diebold, Inc.*, 369 U.S. 654, 655, 8 L. Ed. 2d 176, 82 S. Ct. 993 (1962); *Palumbo v. Don-Joy Co.*, 762 F.2d 969, 973, 226 U.S.P.Q. (BNA) 5, 7 (Fed. Cir. 1985). The party opposing summary judgment must show an evidentiary conflict on the record; mere denials or conclusory statements are not [\*\*18] sufficient. *Barmag Barmer Maschinenfabrik AG v. Murata Machinery, Ltd.*, 731 F.2d 831, 836, 221 U.S.P.Q. (BNA) 561, 564 (Fed. Cir. 1984). Summary judgment is authorized where it is quite clear what the truth is. *Sartor v. Arkansas Natural Gas Corp.*, 321 U.S. 620, 627, 88 L. Ed. 967, 64 S. Ct. 724 (1944).

#### B. The Issues Below

The decision and opinion of the district court granting summary judgment dealt with two issues: the first was whether the '006 patent is invalid as anticipated under § 102(b), the court holding it is not; [\*\*142] and the second was whether the '006 patent is invalid for obviousness under § 103, the court holding that it is. Hodosh of course appeals the summary judgment with respect to only the issue on which it lost -- obviousness -- and Block has not appealed. Because we are remanding for trial, however, we will comment briefly on anticipation to make it clear that we deem that question to have been conclusively disposed of in this case and because it is closely related to the obviousness issue.

##### 1. Anticipation, [\*\*19] § 102(b)

We agree entirely with the district court's holding that the '006 patent is not invalid as anticipated because there is no issue of fact that none of the prior art references discloses every element of the claimed invention. This issue was, therefore, appropriately and properly disposed of by summary judgment.

We do not agree, however, with some of the district court's remarks about anticipation, in particular, that the unavailability of the Chinese references and whether one skilled in the art could locate them with "reasonable diligence" bears on whether those references anticipate the claimed subject matter. Whether a reference is available as prior art and whether it anticipates (i.e., contains every claimed element) are separate questions. Moreover, the district court's determination that the

references are unavailable for § 102 purposes seems to be inconsistent with the approach subsequently taken by the district court in determining obviousness. The court later used these same references to support its holding that the claimed subject matter would have been obvious at the time the invention was made to one of ordinary skill in the art.

## 2. Obviousness, [\*\*20] § 103

Questions of material fact remain with respect to the meaning of various terms used in the Chinese and European references and we therefore hold that summary judgment on the ground of obviousness of the claimed invention was improper.

The district court's statement that *ya tong* means tooth hypersensitivity as well as tooth pain is the resolution of a head-on factual controversy. The court improperly drew the inference against Hodosh, the nonmoving party, that a statement about *ya tong* made to the German Patent Office by Dr. Hodosh's German patent agent was made with knowledge of the Chinese references. The statement in question occurred seven years after the '006 patent issued in connection with Dr. Hodosh's counterpart German application. The statement was: "The supersensitivity of dentine has been known for a long time and can be traced back 4000 years to the Chinese where it was known as 'Ya Tong'." Hodosh in this suit disclaims this statement urging that it was factual error.

There is no evidence that the above statement was based on the Chinese references or that Dr. Hodosh conveyed this information to the German patent agent. The important fact question as [\*\*21] to the meaning of *ya tong* cannot be overcome simply by styling this statement an admission binding on Hodosh. Hodosh is entitled, as Block essentially concedes, to rebut the statement with evidence to the contrary. Hodosh will have that chance at trial.

Nor does the statement in the affidavit of Block's expert, Dr. Wei, that *ya tong* means tooth hypersensitivity eliminate the presence of the question of the meaning of *ya tong*. As the Supreme Court long ago observed, "Experience has shown that opposite opinions of persons professing to be experts, may be obtained to any amount . . . ." *Winans v. New York and Erie Railroad Co.*, 21 How. 88, 62 U.S. 88, 16 L. Ed. 68 (1859). The substance of Dr. Shklar's affidavit on behalf of Hodosh goes far beyond merely denying that *ya tong* means tooth hypersensitivity and thus is more than adequate to show an evidentiary conflict on the record with respect to this crucial point, thus precluding summary judgment. *Cf. Union Carbide Corp. v. American Can Co.*, 724 F.2d 1567, 1571, 220 U.S.P.Q. (BNA) 584, 587-88 (Fed. Cir. 1984).

[\*1143] Furthermore, a genuine issue of material fact exists with respect to the [\*\*22] meaning of the terms nitre, nitrum, and nitri as used in the European references. Dr. Shklar's affidavit is more than adequate to withstand the challenge of this summary judgment motion. A reasonable inference that these terms are sodium, as opposed to potassium, compounds is permissible; Hodosh has shown an evidentiary conflict on the record. The European references, Dr. Shklar explained in his affidavit, are based on the 77 A.D. writings of Pliny The Elder, who understood these terms to mean "sodium carbonate and/or a sodium carbonate-sodium bicarbonate mixture."

The obviousness determination here, given the existence of genuine material issues of fact with respect to the meanings of terms used in these references, is not suitably disposed of by summary judgment under the rules pertaining thereto. *See generally Palumbo*, supra, and *Lemelson v. TRW, Inc.*, 760 F.2d 1254, 1260-61, 225 U.S.P.Q. (BNA) 697, 700-01 (Fed. Cir. 1985). The fact issues herein must be resolved by trial in which the conflicting views of the experts will be subject to the refining fire of cross examination, a more effective means of arriving at the legal conclusion of obviousness [\*\*23] *vel non* than perusal of ex parte affidavits and declarations of partisan experts lobbed at each other from opposing trenches.

We observe, for the benefit of the trial court, that we are totally unimpressed by Block's forensic device of comparing the Rosenthal prior art toothpaste formula and the Hodosh toothpaste example in parallel columns and then asserting, as though it were filled with significant meaning, that the "only difference is the use of potassium nitrate in place of strontium chloride," or that "the Hodosh patent merely substitutes potassium nitrate for strontium chloride." This device was pushed to the limit in oral argument by pointing out that the Hodosh toothpaste has the *same* formula, *except* for the active desensitizing ingredient, down to the last decimal point. This argument is meaningless on the obviousness issue. "Sensodyne" and apparently other desensitizing toothpaste formulae being well known as commercial products, it is entirely clear that Dr. Hodosh's invention was the discovery of an apparently superior *desensitizing agent* and he never thought it was a toothpaste formula. He made that invention even if it should later be decided that it [\*\*24] was known to the Chinese. It is apparent that Hodosh's patent solicitor merely adopted the prior art Rosenthal toothpaste base formula as a convenient example to illustrate the kind of a paste in which the Hodosh desensitizer might be used, which was within his right. The similarities -- indeed, identity -- of the paste bases is irrelevant in considering the issue of the unobviousness of the desensitizer. The Rosenthal patent, cited as prior art by Hodosh in his patent specification, was the

jumping-off place for the description of his discovery. Hodosh does not claim to have been the first inventor of a desensitizing toothpaste; he claims to have improved it. The issue for trial is whether his improvement would have been obvious. n5

n5 Our comments on the district court's obviousness determination generally include the following tenets of patent law that must be adhered to when applying § 103: (1) the claimed invention must be considered as a whole (35 USC 103; *see, e.g., Jones v. Hardy*, 727 F.2d 1524, 1529, 220 U.S.P.Q. (BNA) 1021, 1024 (Fed. Cir. 1984) (though the difference between claimed invention and prior art may seem slight, it may also have been the key to advancement of the art)); (2) the references must be considered as a whole and suggest the desirability and thus the obviousness of making the combination (*see, e.g., Lindemann Maschinenfabrik GmbH v. American Hoist and Derrick Co.*, 730 F.2d 1452, 1462, 221 U.S.P.Q. (BNA) 481, 488 (Fed. Cir. 1984)); (3) the references must be viewed without the benefit of hindsight vision afforded by the claimed invention (*e.g., W. L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553, 220 U.S.P.Q. (BNA) 303, 313 (Fed. Cir. 1983)); (4) "ought to be tried" is not the standard with which obviousness is determined (*Jones*, *supra*, 727 F.2d at 1530, 220 U.S.P.Q. at 1026); and (5) the presumption of validity remains constant and intact throughout litigation (35 USC § 285; *e.g., American Hoist & Derrick Co. v. Sowa & Sons, Inc.*, 725 F.2d 1350, 1359-60, 220 U.S.P.Q. (BNA) 763, 770 (Fed. Cir. 1984)).

[\*\*25]

### C. Secondary Considerations

The district court refused on the motion for summary judgment to consider [\*1144] the evidence of secondary considerations. After acknowledging its existence and the arguments based on it, it stated:

However, the court continues to find that the Hodosh patent is invalid on grounds of obviousness; these secondary considerations stem not from the novelty or inventiveness engendered by substituting potassium nitrate in an already existing formula, but from a lack of knowledge on the part of those in the field of the references here cited. That lack is here overcome by the presumption of omniscience discussed, *supra*, a rule of law by which the court is bound, whatever its merits.

That secondary considerations are not considered unless there is evidence that those in the industry knew of the prior art is a non sequitur. Evidence of secondary considerations is considered independently of what any real person *knows* about the prior art. These considerations are *objective* criteria of obviousness that help illuminate the subjective [\*\*26] determination involved in the hypothesis used to draw the legal conclusion of obviousness based upon the first three factual inquiries delineated in *Graham*. Thus, to require that actual inventors in the field have the omniscience of the hypothetical person in the art is not only contrary to case law, *see Kimberly-Clark v. Johnson & Johnson*, 745 F.2d 1437, 223 U.S.P.Q. (BNA) 603 (Fed. Cir. 1984), but eliminates a useful tool for trial judges faced with a nonobviousness determination.

The secondary consideration evidence of record and the additional evidence likely to be submitted at trial must be considered in the obviousness determination. *See generally Fromson v. Advance Offset Plate, Inc.*, 755 F.2d 1549, 1557, 225 U.S.P.Q. (BNA) 26, 32 (Fed. Cir. 1985).

### Conclusion

The grant of summary judgment of invalidity is *reversed* and the case is *remanded* for trial in accordance with this opinion.

REVERSED AND REMANDED

LEXSEE 227 USPQ 972

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UNITED STATES PATENTS QUARTERLY

Ex parte Clapp

No Number in Original

U.S. Patent and Trademark Office, Board of Patent Appeals and Interferences

227 U.S.P.Q. (BNA) 972

Opinion dated Feb. 28, 1985

**CASE HISTORY and DISPOSITION:** Application for patent of Thomas R. Clapp, Serial No. 257,162, filed Apr. 24, 1981. From rejection of Claim 9-19, applicant appeals (Appeal No. 553-54). Reversed.

**HEADNOTES:**  
**PATENTS**

[\*\*1H] 1. Anticipation -- Combining references (51.205)

To support conclusion that claimed combination is directed to obvious subject matter, references must either expressly or impliedly suggest claimed combination or examiner must present convincing line of reasoning as to why artisan would have found claimed invention to have been obvious in light of references' teachings.

**CLASS-NO:** 51.205

**COUNSEL:** Gomer W. Walters, for appellant.

**JUDGES:** Before Bennett, Henon and Spencer, Examiners-in-Chief.

**OPINIONBY:** Henon, Examiner-in-Chief.

**OPINION:**

This appeal is from the decision of the examiner rejecting claims 9 through 19, which constitute all the claims remaining in the application.

The invention relates to an auger type mixing apparatus for mixing cementitious materials employing a volatile liquid. Representative claim 9 reads as follows:

9. Apparatus mounted on a vehicle for mixing a cementitious material in which a volatile liquid is employed comprising:  
an enclosed mixing chamber sealed to prevent the escape of the volatile liquid and any potentially dangerous fumes;  
a solid frame forming the top of said mixing chamber and having an inlet end thereof pivotably mounted on the vehicle;

227 U.S.P.Q. (BNA) 972, \*; USPQ Headnotes 972, \*\*

an easily removable elastomeric trough forming the bottom of said mixing chamber, the elastomeric material selected to be compatible with the materials being mixed;

an auger having a central shaft and mounted in said frame to convey materials through said mixing chamber;

mixing paddles mounted on the shaft of said auger;

a drive motor for said auger mounted on said frame;

a releasable flexible coupling between the aligned shafts of said motor and said auger to permit removal of said auger from said frame;

an inlet hopper to introduce substantially dry materials into said mixing chamber;

liquid injection means to introduce a liquid into said mixing chamber at a distance removed from said inlet hopper to have said substantially dry material form a plug to prevent the liquid and any fumes from backing up said inlet hopper; and

a discharge opening formed in said elastomeric trough.

The references relied on by the examiner are:

Clemens 2,159,205 May 23, 1939

August 2,709,075 May 24, 1955

Tiemersma 3,199,145 Aug. 10, 1965

Cunningham 3,227,424 Jan. 4, 1966

Zimmerman 3,310,293 Mar. 21, 1967

Futty et al. (Futty) 3,339,898 Sep. 5, 1967

Wilkinson et al. (Wilkinson) 3,348,820 Oct. 24, 1967

Lasar 3,901,483 Aug. 26, 1975

Claims 9 through 14 and 17 stand rejected as being directed to obvious subject matter within the meaning of 35 U.S.C. 103 in light of the teachings of Zimmerman in view of Wilkinson, Futty, Lasar, Clemens and Cunningham. The examiner contends that Zimmerman discloses the claimed subject matter except for "having the mixing chamber enclosed with a solid top frame and having a removable auger and having liquid injection means and aligned shafts between the motor and auger and a discharge formed in the elastomeric trough," (final rejection, page 2, paper number 5). The examiner cites Wilkinson as disclosing an enclosed mixing chamber [\*973] where the enclosure comprises an inverted substantially U-shaped top frame portion and concludes that it therefore would be obvious to the artisan to modify the open frame in Zimmerman to be an enclosed mixing chamber as taught by Wilkinson "if desired." Since Wilkinson also discloses the concept of providing liquid injection means for the introduction of liquid into a mixing chamber remote from the inlet hopper, the examiner concludes that it would therefore be obvious to modify Zimmerman accordingly. Since Lasar discloses the concept of having an auger with mixing paddles mounted thereon wherein the auger is releasably coupled to a frame, the examiner concludes that it would have been obvious to the artisan to modify the auger in Zimmerman as taught by Lasar. Futty is cited to show that it is well known to provide coaxial alignment between an auger shaft and the shaft of a driving motor. Clemens is cited as disclosing the concept of having a discharge opening in a trough. The examiner concludes that it would have been obvious in light of Futty and Clemens to modify the auger motor alignment and discharge opening of Zimmerman to be of the nature suggested by Futty and Clemens. Cunningham is cited as disclosing seal means to preclude leakage of the material within the mixing chamber. The examiner concludes that it would have been obvious in light of the teachings of Cunningham to employ seal means on the modified device of Zimmerman.

Claim 15 stands rejected as being directed to obvious subject matter under 35 U.S.C. 103 in light of the combined teachings of Zimmerman, Wilkinson, Futty, Lasar, Clemens, Cunningham and August. Combining the teachings of Zimmerman, Wilkinson, Futty, Lasar, Clemens and Cunningham in the manner specified supra, the examiner concludes that it would have been further obvious to the artisan in light of the teachings of August to provide spray elements with selectively activated controls since August teaches such devices to be known.

Claims 16, 18 and 19 stand rejected as being directed to obvious subject matter under 35 U.S.C. 103 in light of the combined teachings of Zimmerman, Wilkinson, Fuddy, Lasar, Clemens, Cunningham and Tiemersma. Combining the teachings of Zimmerman, Wilkinson, Fuddy, Lasar, Clemens and Cunningham in the manner specified supra, the examiner concludes that it would have been obvious to further modify the structure of Zimmerman to include a gas-filled bearing housing for sealing purposes.

Rather than reiterate the arguments of appellant and the examiner, reference is made to the brief and answer for the respective details thereof.

Opinion We will not sustain any of the rejections.

Go to Headnotes [\*\*1R] [1] Presuming arguendo that the references show the elements or concepts urged by the examiner, the examiner has presented no line of reasoning, and we know of none, as to why the artisan viewing only the collective teachings of the references would have found it obvious to selectively pick and choose various elements and/or concepts from the several references relied on to arrive at the claimed invention. In the instant application, the examiner has done little more than cite references to show that one or more elements or subcombinations thereof, when each is viewed in a vacuum, is known. The claimed invention, however, is clearly directed to a combination of elements. That is to say, appellant does not claim that he has invented one or more new elements but has presented claims to a new combination of elements. To support the conclusion that the claimed combination is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed combination or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references. We find nothing in the references that would expressly or impliedly teach or suggest the modifications urged by the examiner. Additionally, as aforementioned, we find no line of reasoning in the answer, and we know of none, as to why the artisan would have found the modifications urged by the examiner to have been obvious. Based upon the record before us, we are convinced that the artisan would not have found it obvious to selectively pick and choose elements or concepts from the various references so as to arrive at the claimed invention without using the claims as a guide. It is to be noted that simplicity and hindsight are not proper criteria for resolving the issue of obviousness. Note *In re Horn*, 203 USPQ 969, 971 (CCPA 1979). Accordingly, we will not sustain any of the rejections presented.

The decision of the examiner rejecting claims 9 through 19 as being directed to obvious subject matter within the meaning of 35 U.S.C. 103 is reversed.

LEXSEE 217 F.3D 1365

**IN RE WERNER KOTZAB**

99-1231

**UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT**

**217 F.3d 1365; 2000 U.S. App. LEXIS 15504; 55 U.S.P.Q.2D (BNA) 1313**

**June 30, 2000, Decided**

**PRIOR HISTORY:** **[\*\*1]** Appealed from: U.S. Patent and Trademark Office Board of Patent Appeals and Interferences. (Reexamination No. 90/004,441).

**DISPOSITION:** REVERSED.

**LexisNexis(R) Headnotes**

**COUNSEL:** Robert F. I. Conte, Lee, Mann, Smith, McWilliams, Sweeney & Ohlson, of Chicago, Illinois, argued for appellant. Of counsel were Thomas Eugene Smith and James B. Conte.

Mark Nagumo, Associate Solicitor, U.S. Patent and Trademark Office, of Arlington, Virginia, argued for the appellee. With him on the brief were Albin F. Drost, Acting Solicitor, John M. Whealan, Acting Deputy Solicitor, and Stephen Walsh, Associate Solicitor.

**JUDGES:** Before LOURIE, GAJARSA, and LINN, Circuit Judges.

**OPINIONBY:** LINN

**OPINION:** **[\*1367]** LINN, Circuit Judge.

**DECISION**

Werner Kotzab appeals from the final decision of the Board of Patent Appeals and Interferences ("Board") holding claims 1-10 in reexamination number 90/004,441 unpatentable for obviousness under 35 U.S.C. § 103(a). See *Ex Parte Kotzab*, Paper No. 17 (BPAI July 15, 1998). This case was submitted for our decision following oral argument on April 4, 2000. Because certain of the Board's key factual findings relating to its obviousness analysis are not supported by substantial evidence, and **[\*\*2]**

because the Board erred in concluding that the claims would have been obvious as a matter of law, we reverse.

**BACKGROUND**

**A. The Invention**

The invention involves an injection molding method for forming plastic articles. In such methods, the temperature of the mold must be controlled so that the plastic can harden uniformly throughout the mold. Kotzab was confronted with the problem of providing optimal temperature control for an injection molding method to ensure the quality of the final product on the one hand, and achieving optimally short molding cycle times on the other hand. He arrived at a solution which is embodied in claim 1 of the reexamination as follows:

1. An improved method of controlling the temperature of an injection mold by pressure feeding molding material into a mold recess of an injection mold by an extruder, curing the material in the mold, and removing molded material from the mold, said pressure feeding, curing, and removing being a molding cycle of recurring molding cycles and said recurring molding cycles having at least a first molding cycle and a second molding cycle,

comparing a preset nominal temperature to an actual temperature measured **[\*\*3]** by at least one temperature sensor during said first molding cycle and said second molding cycle and supplying an amount of a temperature controlling medium to the first molding cycle and the second molding cycle, said amount of temperature



controlling medium being dependent on the deviation between the actual temperature measured and the desired preset nominal temperature, the improvement comprising:

controlling, via a single sensor, a plurality of flow control valves for the temperature [\*1368] controlling medium to provide impulse temperature control medium to the first and second molding cycles,

determining empirically or by calculation a quantitative spacial distribution of temperature controlling medium needed to obtain said desired preset nominal temperature during at least the first molding cycle and the second molding cycle and determining empirically or by calculation the conduits needed to be utilized to obtain the desired preset nominal temperature during at least the first molding cycle and the second molding cycle,

comparing said desired preset nominal temperature to said actual temperature, at least once during the first molding cycle and the second molding cycle [\*\*4] at a certain point in time being the same for each said molding cycle, such that said comparison made during said first cycle is synchronized with said comparison made during said second subsequent molding cycle, and said plurality of flow control valves are triggered during each said cycle to provide said impulse control medium, and said triggering being dependent on the deviation of temperature determined for each said comparison and also being dependent on a stored profile of said quantitative spacial distribution of the temperature controlling medium.

J.A. at 18-19.

Claim 3, which depends from claim 1, adds the following further limitation: "wherein a flow measuring turbine is associated with each flow control valve to detect the actual flow in each cycle and wherein a proportioning of a cooling or heating medium is effected in dependence on a comparison of a nominal flow to the actual flow." Id. at 19.

Claim 10, which depends from claim 3, additionally provides that "the rotation of said measuring turbine is

transferred into pulses, so that the nominal flow [of the temperature controlling medium] can be fixed by the presetting of a corresponding number of pulses." [\*\*5] Id. at 20.

#### B. The Reexamination Proceeding

U.S. Patent 5,427,720 ("the '720 patent") issued to Kotzab on June 27, 1995. A third party filed a request for reexamination on November 4, 1996. The reexamination was granted and assigned control no. 90/004,441. The amended claims were finally rejected by the Examiner, and Kotzab appealed the rejections to the Board. On July 15, 1998, the Board affirmed the Examiner's rejection of the claims for essentially the reasons expressed in the Examiner's Answer. The Board did, however, provide its own additional comments primarily for emphasis.

Specifically, the Board agreed with the Examiner that WO 92/08598 ("Evans") discloses a process of controlling the temperature of an injection mold by using a sensor to control the pulsing of a temperature control medium through the mold. Moreover, the Board found, as explained by the Examiner, that Evans discloses in a less preferred embodiment, using only one temperature measurement to control the coolant pulses rather than an average temperature measurement. See Evans application, p.6, ll. 17-23.

In addition, the Board found that Evans discloses that "the optimum timing of the cooling flow [\*\*6] can be selected in accordance with the known temperature of the mould." Id. at ll. 6-8. Furthermore, the Board found that a prior art promotional article discloses that manipulation of the geometry and layout of the cooling segment provides for the greatest improvement in molding cycle. See Horst Wieder, Understanding the pulse modulated mold temperature control method, (CITO Products, Inc., WI.) 1987, at p. 1, col. 2, ll. 13-16. And, the Board determined that a May 1984 prior art article indicates that it was known to establish a cooling regime before the mold is produced, and that the determination of the cooling regime includes the number and location of the cooling conduits, as well as the volume of the coolant flow. Thus, the Board concluded that the evidence of record indicates that it [\*1369] was known in the art to utilize empirical data to design the mold and the distribution of cooling channels in that mold. In view of the foregoing, the Board found that the empirical determination of the necessary spacial distribution of the length of the cooling pulses needed for delivering the appropriate coolant is disclosed by Evans or was known at the time the invention was made. [\*\*7] Consequently, the Board affirmed the Examiner's rejection of claims 1, 2, and 4-9 under 35 U.S.C. § 103(a) as being unpatentable over Evans.

The Board made additional findings related to claims 3 and 10 in determining that they were also unpatentable

under 35 U.S.C. § 103(a) over Evans in view of certain secondary references.

Kotzab filed a request for reconsideration, which the Board denied on November 24, 1998. In that decision, the Board reiterated agreement with the Examiner that it would have been obvious for one of ordinary skill in the art to utilize only one temperature measurement to control the coolant pulses in light of the Evans disclosure. Kotzab timely appealed the Board's decision to this court. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(4)(A) (1994).

## DISCUSSION

### A. Standard of Review

A claimed invention is unpatentable if the differences between it and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art. See 35 U.S.C. § 103(a) (Supp. III 1997); *In re Dembiczak*, 175 F.3d 994, 998, 50 U.S.P.Q.2D (BNA) 1614, 1616 (Fed. Cir. 1999). [\*\*8] The ultimate determination of whether an invention would have been obvious under 35 U.S.C. § 103(a) is a legal conclusion based on underlying findings of fact. See *Dembiczak*, 175 F.3d at 998, 50 U.S.P.Q.2D (BNA) at 1616. We review the Board's ultimate determination of obviousness de novo. See *id.* However, we review the Board's underlying factual findings for substantial evidence. See *In re Gartside*, 203 F.3d 1305, 1316, 53 U.S.P.Q.2D (BNA) 1769, 1776 (Fed. Cir. 2000).

Substantial evidence is something less than the weight of the evidence but more than a mere scintilla of evidence. See *id.* at 1312, 53 U.S.P.Q.2D (BNA) at 1773 (quoting *Consolidated Edison Co. v. NLRB*, 305 U.S. 197, 229-30, 83 L. Ed. 126, 59 S. Ct. 206 (1938)). In reviewing the record for substantial evidence, we must take into account evidence that both justifies and detracts from the factual determinations. See *id.* (citing *Universal Camera Corp. v. NLRB*, 340 U.S. 474, 487-88, 95 L. Ed. 456, 71 S. Ct. 456 (1951)). We note that the possibility of drawing two inconsistent conclusions from the evidence does not prevent the Board's findings [\*\*9] from being supported by substantial evidence. See *id.* Indeed, if a reasonable mind might accept the evidence as adequate to support the factual conclusions drawn by the Board, then we must uphold the Board's determination. See *id.*

### B. Analysis

A critical step in analyzing the patentability of claims pursuant to section 103(a) is casting the mind back to the time of invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted wisdom in the field. See *Dembiczak*, 175 F.3d at 999, 50 U.S.P.Q.2D (BNA) at

1617. Close adherence to this methodology is especially important in cases where the very ease with which the invention can be understood may prompt one "to fall victim to the insidious effect of a hindsight syndrome wherein that which only the invention taught is used against its teacher." *Id.* (quoting *W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553, 220 U.S.P.Q. (BNA) 303, 313 (Fed. Cir. 1983)).

Most if not all inventions arise from a combination of old elements. See *In re Rouffet*, 149 F.3d 1350, 1357, 47 U.S.P.Q.2D (BNA) 1453, 1457 (Fed. Cir. 1998). Thus, [\*\*1370] every [\*\*10] element of a claimed invention may often be found in the prior art. See *id.* However, identification in the prior art of each individual part claimed is insufficient to defeat patentability of the whole claimed invention. See *id.* Rather, to establish obviousness based on a combination of the elements disclosed in the prior art, there must be some motivation, suggestion or teaching of the desirability of making the specific combination that was made by the applicant. See *In re Dance*, 160 F.3d 1339, 1343, 48 U.S.P.Q.2D (BNA) 1635, 1637 (Fed. Cir. 1998); *In re Gordon*, 733 F.2d 900, 902, 221 U.S.P.Q. (BNA) 1125, 1127 (Fed. Cir. 1984). Even when obviousness is based on a single prior art reference, there must be a showing of a suggestion or motivation to modify the teachings of that reference. See *B.F. Goodrich Co. v. Aircraft Braking Sys. Corp.*, 72 F.3d 1577, 1582, 37 U.S.P.Q.2D (BNA) 1314, 1318 (Fed. Cir. 1996).

The motivation, suggestion or teaching may come explicitly from statements in the prior art, the knowledge of one of ordinary skill in the art, or, in some cases the nature of the problem to be solved. See *Dembiczak*, 175 F.3d at 999, 50 U.S.P.Q.2D (BNA) at 1617. [\*\*11] In addition, the teaching, motivation or suggestion may be implicit from the prior art as a whole, rather than expressly stated in the references. See *WMS Gaming, Inc. v. International Game Tech.*, 184 F.3d 1339, 1355, 51 U.S.P.Q.2D (BNA) 1385, 1397 (Fed. Cir. 1999). The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 425, 208 U.S.P.Q. (BNA) 871, 881 (CCPA 1981) (and cases cited therein). Whether the Board relies on an express or an implicit showing, it must provide particular findings related thereto. See *Dembiczak*, 175 F.3d at 999, 50 U.S.P.Q.2D (BNA) at 1617. Broad conclusory statements standing alone are not "evidence." *Id.*

Kotzab's primary argument that the Board erred in holding claims 1-10 unpatentable under 35 U.S.C. § 103(a) over Evans, or Evans in view of secondary references, is that Evans does not teach or suggest the use

of a single temperature sensor to control a plurality of flow control valves. We agree.

As noted previously, [\*\*12] the Board adopted the Examiner's reasoning in upholding the rejection of the claims and added further comments. None of the Board's comments relate to the issue of Evans teaching or suggesting the use of one sensor to control a number of valves regulating coolant flow to the mold. Thus, we look to the Examiner's reasons for finding this limitation to be expressly taught or suggested in Evans.

The Examiner cites Evans for teaching that "one system constructed and operated according to the invention may be used to control a number of valves." Evans application, p. 19, ll. 6-8 (emphasis added). In view of this disclosure only, the Examiner concluded that Evans teaches the use of one sensor to control a number of valves. This conclusion must necessarily rest on the unstated premise by the Examiner that "one system" is equal to "one sensor."

But the Board's decision, adopting the Examiner's premise, lacks the necessary substantial evidence to support a rejection of Kotzab's claims. Specifically, there is not substantial evidence to show that "one system" is the same thing as "one sensor." The words "sensor" and "probe" are used throughout Evans to refer to the device that [\*\*13] measures the mold temperature. Evans uses the word "signal" to refer to the response generated by the measured temperature that controls the valves for coolant flow. Finally, the word "system" is used in Evans to refer to the overall temperature control system that is responsible for the valve timing for coolant flow to increase or decrease the temperature of the mold. Evans clearly never uses the term "system" as a substitute for the simple temperature measuring device it calls "sensor." And, the Board made no reference to any evidence in the record that [\*1371] would equate "one system" with "one sensor."

As mentioned previously, more than a mere scintilla of evidence is necessary to support the Board's implicit conclusion that "one system" is equal to "one sensor." Based on the entirety of Evans' disclosure, we cannot say that there is such relevant evidence as a reasonable mind might accept as adequate to support the conclusion that "one system" means "one sensor."

The United States Patent and Trademark Office argues that because Evans teaches that a single sensor may be used to provide "the temperature measurement at a selected part of the machine," it necessarily follows that the Evans [\*\*14] "system" discussed later may have a single sensor--and that single sensor may control more than one valve. See id. at p. 6, ll. 21-23; p. 19, ll. 6-8. While the test for establishing an implicit teaching, motivation, or suggestion is what the combination of these

two statements of Evans would have suggested to those of ordinary skill in the art, the two statements cannot be viewed in the abstract. Rather, they must be considered in the context of the teaching of the entire reference. Further, a rejection cannot be predicated on the mere identification in Evans of individual components of claimed limitations. Rather, particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed.

We do not take issue with the argument that Evans suggests the concept of using the historic temperature obtained by one temperature measurement to control coolant pulses. See id. at p. 5, ll. 14-22; p. 6, ll. 17-23. However, there is not substantial evidence of record to extrapolate this teaching to the multiple zone system described later in Evans. See id. at p. 18, l. [\*\*15] 22 to p. 19, l. 8. In the multiple zone system, Evans describes the use of a temperature sensor and an associated flow control valve in each zone. At most, the combined teachings suggest that the historic temperature of a mold zone may be measured by one sensor, and as part of a multiple zone system where multiple valves are controlled, that one sensor measurement can be used to control the valve for that zone. Thus, we cannot say that there is such relevant evidence as a reasonable mind might accept as adequate to support the conclusion that where there are a plurality of control valves in a multiple zone setting, only one temperature sensor provides the control for a plurality of valves.

Moreover, we cannot say that there is such relevant evidence as a reasonable mind might accept as adequate to support implicitly the conclusion that a skilled artisan confronted with (1) the problem noted by Kotzab, i.e., providing optimal temperature control for an injection molding method to ensure the quality of the final product on the one hand, and achieving optimally short molding cycle times on the other hand, and (2) the two statements in Evans, would have been motivated to control a plurality [\*\*16] of valves in a multiple zone setting with only one temperature sensor.

In this case, the Examiner and the Board fell into the hindsight trap. The idea of a single sensor controlling multiple valves, as opposed to multiple sensors controlling multiple valves, is a technologically simple concept. With this simple concept in mind, the Patent and Trademark Office found prior art statements that in the abstract appeared to suggest the claimed limitation. But, there was no finding as to the specific understanding or principle within the knowledge of a skilled artisan that would have motivated one with no knowledge of Kotzab's invention to make the combination in the manner claimed. In light of our holding of the absence of a motivation to combine the teachings in Evans, we [\*1372] conclude

217 F.3d 1365, \*; 2000 U.S. App. LEXIS 15504, \*\*;  
55 U.S.P.Q.2D (BNA) 1313

that the Board did not make out a proper prima facie case of obviousness in rejecting claims 1, 2, and 4-9 under 35 U.S.C. § 103(a) over Evans. Moreover, because the rejections of claims 3 and 10 rely upon the foregoing, we also conclude that the Board did not make out a proper prima facie case of obviousness in rejecting those claims under 35 U.S.C. § 103 [\*\*17] (a).

#### CONCLUSION

For the above reasons, we conclude that there is not substantial evidence to support the Board's finding of fact that Evans expressly teaches that "one sensor" may be used to control a plurality of valves, and there is not substantial evidence of record, either expressly or implicitly, to modify the teachings of Evans to obtain a system in which one sensor controls a plurality of valves. Accordingly, we

REVERSE.

LEXSEE 277 F.3D 1338

IN RE SANG SU LEE

00-1158

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

277 F.3d 1338; 2002 U.S. App. LEXIS 855; 61 U.S.P.Q.2D (BNA) 1430

January 18, 2002, Decided

**PRIOR HISTORY:** [\*\*1] Appealed from: Patent & Trademark Office Board of Patent Appeals and Interferences. (Serial No. 07/631,240).

n1 Ex parte Lee, No. 1994-1989 (Bd. Pat. App. & Int. Aug. 30, 1994; on reconsid'n Sept. 29, 1999).

**DISPOSITION:** Vacated and remanded.

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**LexisNexis(R) Headnotes**

**The Prosecution Record**

**COUNSEL:** Richard H. Stern, of Washington, DC, argued for Sang Su Lee. With him on the brief was Robert E. Bushnell.

Mr. Lee's patent application is directed to a method of automatically displaying the functions of a video display device and demonstrating how to select and adjust the functions in order to facilitate response by the user. The display and demonstration are achieved using computer-managed electronics, including pulse-width modulation and auto-fine-tuning pulses, in accordance with procedures described in the specification. Claim 10 is representative:

Sidney O. Johnson, Jr., Associate Solicitor, of Arlington, Virginia, argued for the Director of the U.S. Patent and Trademark Office. With him on the brief were John M. Whealan, Solicitor, and Raymond T. Chen, Associate Solicitor. Of counsel were Maximilian R. Peterson and Mark Nagumo, Associate Solicitors.

10. A method for automatically displaying functions of a video display device, comprising:

**JUDGES:** Before NEWMAN, CLEVINGER, and DYK, Circuit Judges.

determining if a demonstration mode is selected;

**OPINIONBY:** NEWMAN

if said demonstration mode is selected, automatically entering a picture adjustment mode having a picture menu screen displaying a list of a plurality of picture functions; and

**OPINION:** [\*1340] NEWMAN, Circuit Judge.

automatically demonstrating selection and adjustment of individual ones of said plurality of picture functions.

Sang-Su Lee appeals the decision of the Board of Patent Appeals and Interferences of the United States Patent and Trademark Office, rejecting all of the claims of Lee's patent application Serial No. 07/631,210 entitled "Self-Diagnosis and Sequential-Display Method of Every Function." n1 We vacate the Board's decision for failure to meet the adjudicative standards for review under the Administrative Procedure Act, and remand for further proceedings.

The examiner rejected the claims on the ground of obviousness, citing the combination of two references:

United States Patent No. 4,626,892 to Nortrup, and the Thunderchopper Helicopter Operations [\*1341] Handbook for a video game. The Nortrup reference describes a television [\*\*3] set having a menu display by which the user can adjust various picture and audio functions; however, the Nortrup display does not include a demonstration of how to adjust the functions. The Thunderchopper Handbook describes the Thunderchopper game's video display as having a "demonstration mode" showing how to play the game; however, the Thunderchopper Handbook makes no mention of the adjustment of picture or audio functions. The examiner held that it would have been obvious to a person of ordinary skill to combine the teachings of these references to produce the Lee system.

Lee appealed to the Board, arguing that the Thunderchopper Handbook simply explained how to play the Thunderchopper game, and that the prior art provided no teaching or motivation or suggestion to combine this reference with Nortrup, or that such combination would produce the Lee invention. The Board held that it was not necessary to present a source of a teaching, suggestion, or motivation to combine these references or their teachings. The Board stated:

The conclusion of obviousness may be made from common knowledge and common sense of a person of ordinary skill in the art without any specific hint or [\*\*4] suggestion in a particular reference.

Board op. at 7. The Board did not explain the "common knowledge and common sense" on which it relied for its conclusion that "the combined teachings of Nortrup and Thunderchopper would have suggested the claimed invention to those of ordinary skill in the art."

Lee filed a request for reconsideration, to which the Board responded after five years. The Board reaffirmed its decision, stating that the Thunderchopper Handbook was "analogous art" because it was "from the same field of endeavor" as the Lee invention, and that the field of video games was "reasonably pertinent" to the problem of adjusting display functions because the Thunderchopper Handbook showed video demonstrations of the "features" of the game. On the matter of motivation to combine the Nortrup and Thunderchopper references, the Board stated that "we maintain the position that we stated in our prior decision" and that the Examiner's Answer provided "a well reasoned discussion of why there is sufficient motivation to combine the references." The Board did not state the examiner's reasoning, and review of the Examiner's Answer reveals that the examiner merely stated that both [\*\*5] the Nortrup function menu and the Thunderchopper demonstration mode are program

features and that the Thunderchopper mode "is user-friendly" and it functions as a tutorial, and that it would have been obvious to combine them.

Lee had pressed the examiner during prosecution for some teaching, suggestion, or motivation in the prior art to select and combine the references that were relied on to show obviousness. The Examiner's Answer before the Board, plus a Supplemental Answer, stated that the combination of Thunderchopper with Nortrup "would have been obvious to one of ordinary skill in the art since the demonstration mode is just a programmable feature which can be used in many different devices for providing automatic introduction by adding the proper programming software," and that "another motivation would be that the automatic demonstration mode is user friendly and it functions as a tutorial." The Board adopted the examiner's answer, stating "the examiner has provided a well reasoned discussion of these references and how the combination of these references meets the claim limitations." However, perhaps recognizing that the examiner had provided insufficient justification to [\*\*6] [\*1342] support combining the Nortrup and Thunderchopper references, the Board held, as stated *supra*, that a "specific hint or suggestion" of motivation to combine was not required.

This appeal followed.

### *Judicial Review*

Tribunals of the PTO are governed by the Administrative Procedure Act, and their rulings receive the same judicial deference as do tribunals of other administrative agencies. *Dickinson v. Zurko*, 527 U.S. 150, 50 U.S.P.Q.2D (BNA) 1930, 144 L. Ed. 2d 143, 119 S. Ct. 1816 (1999). Thus on appeal we review a PTO Board's findings and conclusions in accordance with the following criteria:

5 U.S.C. § 706(2) The reviewing court shall--

(2) hold unlawful and set aside agency actions, findings, and conclusions found to be--

(A) arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law;

\*\*\*\*

(E) unsupported by substantial evidence in a case subject to sections 556 and 557 of this title or otherwise reviewed on the

record of an agency hearing provided by statute;

For judicial review to be meaningfully achieved within these strictures, the agency tribunal must present a full and reasoned [\*\*7] explanation of its decision. The agency tribunal must set forth its findings and the grounds thereof, as supported by the agency record, and explain its application of the law to the found facts. The Court has often explained:

The Administrative Procedure Act, which governs the proceedings of administrative agencies and related judicial review, establishes a scheme of "reasoned decisionmaking." Not only must an agency's decreed result be within the scope of its lawful authority, but the process by which it reaches that result must be logical and rational.

Allentown Mack Sales and Service, Inc. v. National Labor Relations Bd., 522 U.S. 359, 374, 139 L. Ed. 2d 797, 118 S. Ct. 818 (1998) (citation omitted). This standard requires that the agency not only have reached a sound decision, but have articulated the reasons for that decision. The reviewing court is thus enabled to perform meaningful review within the strictures of the APA, for the court will have a basis on which to determine "whether the decision was based on the relevant factors and whether there has been a clear error of judgment." *Citizens to Preserve Overton Park v. Volpe*, 401 U.S. 402, 416, 28 L. Ed. 2d 136, 91 S. Ct. 814 (1971). [\*\*8] Judicial review of a Board decision denying an application for patent is thus founded on the obligation of the agency to make the necessary findings and to provide an administrative record showing the evidence on which the findings are based, accompanied by the agency's reasoning in reaching its conclusions. See *In re Zurko*, 258 F.3d 1379, 1386, 59 U.S.P.Q.2D (BNA) 1693, 1697 (Fed. Cir. 2001) (review is on the administrative record); *In re Gartside*, 203 F.3d 1305, 1314, 53 U.S.P.Q.2D (BNA) 1769, 1774 (Fed. Cir. 2000) (Board decision "must be justified within the four corners of the record").

As applied to the determination of patentability vel non when the issue is obviousness, "it is fundamental that rejections under 35 U.S.C. § 103 must be based on evidence comprehended by the language of that section." *In re Grasselli*, 713 F.2d 731, 739, 218 U.S.P.Q. (BNA) 769, 775 (Fed. Cir. 1983). The essential factual evidence on the issue of obviousness is set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 148 U.S.P.Q. (BNA) 459, 467, 15 L. Ed. 2d 545, 86 S. Ct. 684 (1966) and extensive

ensuing precedent. The patent examination [\*1343] process [\*\*9] centers on prior art and the analysis thereof. When patentability turns on the question of obviousness, the search for and analysis of the prior art includes evidence relevant to the finding of whether there is a teaching, motivation, or suggestion to select and combine the references relied on as evidence of obviousness. See, e.g., *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1351-52, 60 U.S.P.Q.2D (BNA) 1001, 1008 (Fed. Cir. 2001) ("the central question is whether there is reason to combine [the] references," a question of fact drawing on the Graham factors).

"The factual inquiry whether to combine references must be thorough and searching." *Id.* It must be based on objective evidence of record. This precedent has been reinforced in myriad decisions, and cannot be dispensed with. See, e.g., *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1124-25, 56 U.S.P.Q.2D (BNA) 1456, 1459 (Fed. Cir. 2000) ("a showing of a suggestion, teaching, or motivation to combine the prior art references is an 'essential component of an obviousness holding'") (quoting *C.R. Bard, Inc., v. M3 Systems, Inc.*, 157 F.3d 1340, 1352, 48 U.S.P.Q.2D (BNA) 1225, 1232 (Fed. Cir. 1998)); [\*\*10] *In re Dembiczak*, 175 F.3d 994, 999, 50 U.S.P.Q.2D (BNA) 1614, 1617 (Fed. Cir. 1999) ("Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references."); *In re Dance*, 160 F.3d 1339, 1343, 48 U.S.P.Q.2D (BNA) 1635, 1637 (Fed. Cir. 1998) (there must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant); *In re Fine*, 837 F.2d 1071, 1075, 5 U.S.P.Q.2D (BNA) 1596, 1600 (Fed. Cir. 1988) ("teachings of references can be combined only if there is some suggestion or incentive to do so.") (emphasis in original) (quoting *ACS Hosp. Sys., Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577, 221 U.S.P.Q. (BNA) 929, 933 (Fed. Cir. 1984)).

The need for specificity pervades this authority. See, e.g., *In re Kotzab*, 217 F.3d 1365, 1371, 55 U.S.P.Q.2D (BNA) 1313, 1317 (Fed. Cir. 2000) ("particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, [\*\*11] would have selected these components for combination in the manner claimed"); *In re Rouffet*, 149 F.3d 1350, 1359, 47 U.S.P.Q.2D (BNA) 1453, 1459 (Fed. Cir. 1998) ("even when the level of skill in the art is high, the Board must identify specifically the principle, known to one of ordinary skill, that suggests the claimed combination. In other words, the Board must explain the reasons one of ordinary skill in the art would have been motivated to

select the references and to combine them to render the claimed invention obvious."); In re Fritch, 972 F.2d 1260, 1265, 23 U.S.P.Q.2D (BNA) 1780, 1783 (Fed. Cir. 1992) (the examiner can satisfy the burden of showing obviousness of the combination "only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references").

With respect to Lee's application, neither the examiner nor the Board adequately supported the selection and combination of the Nortrup and Thunderchopper references to render obvious that which Lee described. The examiner's conclusory statements that "the demonstration mode [\*\*12] is just a programmable feature which can be used in many different devices for providing automatic introduction by adding the proper programming software" and that "another motivation would be that the automatic demonstration mode is user friendly and it functions as a tutorial" do not adequately address the issue of motivation to combine. This factual question [\*1344] of motivation is material to patentability, and could not be resolved on subjective belief and unknown authority. It is improper, in determining whether a person of ordinary skill would have been led to this combination of references, simply to "[use] that which the inventor taught against its teacher." *W.L. Gore v. Garlock, Inc.*, 721 F.2d 1540, 1553, 220 U.S.P.Q. (BNA) 303, 312-13 (Fed. Cir. 1983). Thus the Board must not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the agency's conclusion.

Deferential judicial review under the Administrative Procedure Act does not relieve the agency of its obligation to develop an evidentiary basis for its findings. To the contrary, the Administrative Procedure Act reinforces [\*\*13] this obligation. See, e.g., *Motor Vehicle Manufacturers Ass'n v. State Farm Mutual Automobile Ins. Co.*, 463 U.S. 29, 43, 77 L. Ed. 2d 443, 103 S. Ct. 2856 (1983) ("the agency must examine the relevant data and articulate a satisfactory explanation for its action including a 'rational connection between the facts found and the choice made.'") (quoting *Burlington Truck Lines v. United States*, 371 U.S. 156, 168, 9 L. Ed. 2d 207, 83 S. Ct. 239 (1962)); *Securities & Exchange Comm'n v. Chenery Corp.*, 318 U.S. 80, 94, 87 L. Ed. 626, 63 S. Ct. 454 (1943) ("The orderly function of the process of review requires that the grounds upon which the administrative agency acted are clearly disclosed and adequately sustained.").

In its decision on Lee's patent application, the Board rejected the need for "any specific hint or suggestion in a particular reference" to support the combination of the

Nortrup and Thunderchopper references. Omission of a relevant factor required by precedent is both legal error and arbitrary agency action. See *Motor Vehicle Manufacturers*, 463 U.S. at 43 ("an agency rule would be arbitrary and [\*\*14] capricious if the agency . . . entirely failed to consider an important aspect of the problem"); *Mullins v. Department of Energy*, 50 F.3d 990, 992 (Fed. Cir. 1995) ("It is well established that agencies have a duty to provide reviewing courts with a sufficient explanation for their decisions so that those decisions may be judged against the relevant statutory standards, and that failure to provide such an explanation is grounds for striking down the action."). As discussed in *National Labor Relations Bd. v. Ashkenazy Property Mgt. Corp.*, 817 F.2d 74, 75 (9th Cir. 1987), an agency is "not free to refuse to follow circuit precedent."

The foundation of the principle of judicial deference to the rulings of agency tribunals is that the tribunal has specialized knowledge and expertise, such that when reasoned findings are made, a reviewing court may confidently defer to the agency's application of its knowledge in its area of expertise. Reasoned findings are critical to the performance of agency functions and judicial reliance on agency competence. See *Baltimore and Ohio R. R. Co. v. Aberdeen & Rockfish R. R. Co.*, 393 U.S. 87, 91-92, 21 L. Ed. 2d 219, 89 S. Ct. 280 (1968) [\*\*15] (absent reasoned findings based on substantial evidence effective review would become lost "in the haze of so-called expertise"). The "common knowledge and common sense" on which the Board relied in rejecting Lee's application are not the specialized knowledge and expertise contemplated by the Administrative Procedure Act. Conclusory statements such as those here provided do not fulfill the agency's obligation. This court explained in *Zurko*, 258 F.3d at 1385, 59 U.S.P.Q.2D (BNA) at 1697, that "deficiencies of the cited references cannot be remedied by the Board's general conclusions about what is 'basic knowledge' or 'common sense.'" The [\*1345] Board's findings must extend to all material facts and must be documented on the record, lest the "haze of so-called expertise" acquire insulation from accountability. "Common knowledge and common sense," even if assumed to derive from the agency's expertise, do not substitute for authority when the law requires authority. See *Allentown Mack*, 522 U.S. at 376 ("Because reasoned decisionmaking demands it, and because the systemic consequences of any other approach are unacceptable, the Board must be required to apply in fact the [\*\*16] clearly understood legal standards that it enunciates in principle . . .")

The case on which the Board relies for its departure from precedent, *In re Bozek*, 57 C.C.P.A. 713, 416 F.2d 1385, 163 U.S.P.Q. (BNA) 545 (CCPA 1969), indeed mentions "common knowledge and common sense," the



CCPA stating that the phrase was used by the Solicitor to support the Board's conclusion of obviousness based on evidence in the prior art. Bozek did not hold that common knowledge and common sense are a substitute for evidence, but only that they may be applied to analysis of the evidence. Bozek did not hold that objective analysis, proper authority, and reasoned findings can be omitted from Board decisions. Nor does Bozek, after thirty-two years of isolation, outweigh the dozens of rulings of the Federal Circuit and the Court of Customs and Patent Appeals that determination of patentability must be based on evidence. This court has remarked, in *Smiths Industries Medical Systems, Inc. v. Vital Signs, Inc.*, 183 F.3d 1347, 1356, 51 U.S.P.Q.2D (BNA) 1415, 1421 (Fed. Cir. 1999), that Bozek's reference to common knowledge "does not in and of itself make it so" absent evidence [\*\*17] of such knowledge.

The determination of patentability on the ground of unobviousness is ultimately one of judgment. In furtherance of the judgmental process, the patent examination procedure serves both to find, and to place on the official record, that which has been considered with respect to patentability. The patent examiner and the Board are deemed to have experience in the field of the invention; however, this experience, insofar as applied to the determination of patentability, must be applied from the viewpoint of "the person having ordinary skill in the art to which said subject matter pertains," the words of section 103. In finding the relevant facts, in assessing the significance of the prior art, and in making the ultimate determination of the issue of obviousness, the examiner and the Board are presumed to act from this viewpoint. Thus when they rely on what they assert to be general knowledge to negate patentability, that knowledge must be articulated and placed on the record. The failure to do so is not consistent with either effective administrative procedure or effective judicial review. The board cannot rely on conclusory statements when dealing with particular combinations [\*\*18] of prior art and specific claims, but must set forth the rationale on which it relies.

#### *Alternative Grounds*

At oral argument the PTO Solicitor proposed alternative grounds on which this court might affirm the Board's decision. However, as stated in *Burlington Truck Lines, Inc. v. United States*, 371 U.S. 156, 168, 9 L. Ed. 2d 207, 83 S. Ct. 239 (1962), "courts may not accept appellate counsel's post hoc rationalization for agency action." Consideration by the appellate tribunal of new

agency justifications deprives the aggrieved party of a fair opportunity to support its position; thus review of an administrative decision must be made on the grounds relied on by the agency. "If those grounds are inadequate or improper, the court is powerless to affirm the administrative action by substituting what it considers [\*1346] to be a more adequate or proper basis." *Securities & Exchange Comm'n v. Chenery Corp.*, 332 U.S. 194, 196, 91 L. Ed. 1995, 67 S. Ct. 1575 (1947). As reiterated in *Federal Election Comm'n v. Akins*, 524 U.S. 11, 25, 118 S. Ct. 1777, 141 L. Ed. 2d 10 (1998), "If a reviewing court agrees that the agency misinterpreted the law, it will set aside the [\*\*19] agency's action and remand the case -- even though the agency (like a new jury after a mistrial) might later, in the exercise of its lawful discretion, reach the same result for a different reason." Thus we decline to consider alternative grounds that might support the Board's decision.

#### *Further Proceedings*

Sound administrative procedure requires that the agency apply the law in accordance with statute and precedent. The agency tribunal must make findings of relevant facts, and present its reasoning in sufficient detail that the court may conduct meaningful review of the agency action. In *Radio-Television News Directors Ass'n v. FCC*, 337 U.S. App. D.C. 292, 184 F.3d 872 (D.C. Cir. 1999) the court discussed the "fine line between agency reasoning that is 'so crippled as to be unlawful' and action that is potentially lawful but insufficiently or inappropriately explained," quoting from *Checkosky v. Securities & Exch. Comm'n*, 306 U.S. App. D.C. 144, 23 F.3d 452, 464 (D.C. Cir. 1994); the court explained that "in the former circumstance, the court's practice is to vacate the agency's order, while in the latter the court frequently remands for further explanation [\*\*20] (including discussion of the relevant factors and precedents) while withholding judgment on the lawfulness of the agency's proposed action." 184 F.3d at 888. In this case the Board's analysis of the Lee invention does not comport with either the legal requirements for determination of obviousness or with the requirements of the Administrative Procedure Act that the agency tribunal set forth the findings and explanations needed for "reasoned decisionmaking." Remand for these purposes is required. See *Overton Park*, 401 U.S. at 420-221 (remanding for further proceedings appropriate to the administrative process).

VACATED AND REMANDED

LEXSEE 837 F.2D 1071

In re David H. Fine

No. 87-1319

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

837 F.2d 1071; 1988 U.S. App. LEXIS 686; 5 U.S.P.Q.2D (BNA) 1596

January 26, 1988, Decided

**PRIOR HISTORY:** [\*\*1]

Appealed from: Board of Patent Appeals and Interferences of the United States Patent and Trademark Office.

**LexisNexis(R) Headnotes**

**COUNSEL:**

Morris Relson, Darby & Darby, P.C., argued for Appellant. With him on the brief was Beverly B. Goodwin.

Lee E. Barrett, Associate Solicitor, Office of the Solicitor, argued for Appellee. With him on the brief were Joseph F. Nakamura, Solicitor and Fred E. McKelvey, Deputy Solicitor.

**JUDGES:**

Friedman, Smith, and Mayer, Circuit Judges. Smith, Circuit Judge, dissenting.

**OPINIONBY:**

MAYER

**OPINION:**

[\*1072] MAYER, Circuit Judge.

David H. Fine appeals from a decision of the Board of Patent Appeals and Interferences of the United States Patent and Trademark Office (Board) affirming the rejection of certain claims of his application, Serial No. 512,374, and concluding that his invention would have been obvious to one of ordinary skill in the art and was

therefore unpatentable under 35 U.S.C. § 103. We reverse.

**Background**

**A. The Invention.**

The invention claimed is a system for detecting and measuring minute quantities of nitrogen compounds. According to Fine, the system has the ability to detect the presence of nitrogen compounds in quantities [\*\*2] as minute as one part in one billion, and is an effective means to detect drugs and explosives, which emanate nitrogen compound vapors even when they are concealed in luggage and closed containers.

The claimed invention has three major components: (1) a gas chromatograph which separates a gaseous sample into its constituent parts; (2) a converter which converts the nitrogen compound effluent output of the chromatograph into nitric oxide in a hot, oxygen-rich environment; and (3) a detector for measuring the level of nitric oxide. The claimed invention's sensitivity is achieved by combining nitric oxide with ozone to produce nitrogen dioxide which concurrently causes a detectable luminescence. The luminescence, which is measured by a visual detector, shows the level of nitric oxide which in turn is a measure of nitrogen compounds found in the sample.

The appealed claims were rejected by the Patent and Trademark Office (PTO) under 35 U.S.C. § 103. Claims 60, 63, 77 and 80 were rejected as unpatentable over Eads, Patent No. 3,650,696 (Eads) in view of Warnick, et al., Patent No. 3,746,513 (Warnick). Claims 62, 68, 69, 79, 85 and 86 were rejected as unpatentable [\*\*3] over Eads and Warnick in view of Glass, et al., Patent No. 3,207,585 (Glass).

**B. The Prior Art.**

### 1. Eads Patent.

Eads discloses a method for separating, identifying and quantitatively monitoring [\*1073] sulfur compounds. The Eads system is used primarily in "air pollution control work in the scientific characterization of odors from sulfur compounds."

The problem addressed by Eads is the tendency of sulfur compounds "to adhere to or react with the surface materials of the sampling and analytical equipment, and/or react with the liquid or gaseous materials in the equipment." Because of this, the accuracy of measurement is impaired. To solve the problem, the Eads system collects an air sample containing sulfur compounds in a sulfur-free methanol solution. The liquid is inserted into a gas chromatograph which separates the various sulfur compounds. The compounds are next sent through a pyrolysis furnace where they are oxidized to form sulfur dioxide. Finally, the sulfur dioxide passes through a measuring device called a microcoulometer which uses titration cells to calculate the concentration of sulfur compounds in the sample.

### 2. Warnick Patent.

Warnick [\*4] is directed to a means for detecting the quantity of pollutants in the atmosphere. By measuring the chemiluminescence of the reaction between nitric oxide and ozone, the Warnick device can detect the concentration of nitric oxide in a sample gaseous mixture.

Warnick calls for "continuously flowing" a sample gaseous mixture and a reactant containing ozone into a reaction chamber. The chemiluminescence from the resulting reaction is transmitted through a light-transmitting element to produce continuous readouts of the total amount of nitric oxide present in the sample.

### 3. Glass Patent.

The invention disclosed in Glass is a device for "completely burning a measured amount of a substance and analyzing the combustion products." A fixed amount of a liquid petroleum sample and oxygen are supplied to a flame. The flame is then spark-ignited, causing the sample to burn. The resulting combustion products are then collected and measured, and from this measurement the hydrogen concentration in the sample is computed.

### C. The Rejection.

The Examiner rejected claims 60, 63, 77 and 80 because "substitution of the [nitric oxide] detector of Warnick for the sulfur detector of Eads [\*5] would be an obvious consideration if interested in nitrogen compounds, and would yield the claimed invention." He further asserted that "Eads teaches the [claimed] combination of

chromatograph, combustion, and detection, in that order. . . . Substitution of detectors to measure any component of interest is well within the skill of the art." In rejecting claims 62, 68, 69, 79, 85 and 86, the Examiner said, "Glass et al. teach a flame conversion means followed by a detector, and substitution of the flame conversion means of Glass et al. for the furnace of Eads would be an obvious equivalent and would yield the claimed invention." The Board affirmed the Examiner's rejection.

### Discussion

#### A. Standard of Review.

Obviousness under 35 U.S.C. § 103 is "a legal conclusion based on factual evidence." *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1535, 218 USPQ 871, 876 (Fed. Cir. 1983) (quoting *Stevenson v. Int'l Trade Comm'n*, 612 F.2d 546, 549, 204 USPQ 276, 279, 67 C.C.P.A. 109 (CCPA 1979)). Therefore, an obviousness determination [\*\*6] is not reviewed under the clearly erroneous standard applicable to fact findings, *Raytheon Co. v. Roper Corp.*, 724 F.2d 951, 956, 220 USPQ 592, 596 (Fed. Cir. 1983); it is "reviewed for correctness or error as a matter of law." *In re De Blauwe*, 736 F.2d 699, 703, 222 USPQ 191, 195 (Fed. Cir. 1984).

To reach a proper conclusion under § 103, the decisionmaker must step backward in time and into the shoes worn by [a person having ordinary skill in the art] when the invention was unknown and just before it was made. In light of *all* the evidence, the decisionmaker must then determine whether . . . the claimed invention as a whole would have been [\*1074] obvious at *that* time to *that* person. 35 U.S.C. § 103. The answer to that question partakes more of the nature of law than of fact, for it is an ultimate conclusion based on a foundation formed of all the probative facts.

*Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1566, 1 USPQ2d 1593, 1595-96 (Fed. Cir. 1987).

#### B. Prima [\*\*7] Facie Obviousness.

Fine says the PTO has not established a *prima facie* case of obviousness. He contends the references applied by the Board and Examiner were improperly combined, using hindsight reconstruction, without evidence to

support the combination and in the face of contrary teachings in the prior art. He argues that the appealed claims were rejected because the PTO thought it would have been "obvious to try" the claimed invention, an unacceptable basis for rejection.

We agree. The PTO has the burden under section 103 to establish a *prima facie* case of obviousness. See *In re Piasecki*, 745 F.2d 1468, 1471-72, 223 USPQ 785, 787-87 (Fed. Cir. 1984). It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. *In re Lahu*, 747 F.2d 703, 705, 223 USPQ 1257, 1258 (Fed. Cir. 1984); see also *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 297 n. 24, 227 USPQ 657, 667 n.24 (Fed. Cir. 1985); [\*\*8] *ACS Hosp. Sys., Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). This it has not done. The Board points to nothing in the cited references, either alone or in combination, suggesting or teaching Fine's invention.

The primary basis for the Board's affirmance of the Examiner's rejection was that it would have been obvious to substitute the Warnick nitric oxide detector for the Eads sulfur dioxide detector in the Eads system. The Board reiterated the Examiner's bald assertion that "substitution of one type of detector for another in the system of Eads would have been within the skill of the art," but neither of them offered any support for or explanation of this conclusion.

Eads is limited to the analysis of sulfur compounds. The particular problem addressed there is the difficulty of obtaining precise measurements of sulfur compounds because of the tendency of sulfur dioxide to adhere to or react with the sampling analytic equipment or the liquid or gaseous materials in the equipment. It solves this problem by suggesting that the gaseous sample containing sulfur compounds be absorbed into sulfur-free methanol and then inserted into [\*\*9] a gas chromatograph to separate the sulfur compounds.

There is no suggestion in Eads, which focuses on the unique difficulties inherent in the measurement of sulfur, to use that arrangement to detect nitrogen compounds. In fact, Eads says that the presence of nitrogen is undesirable because the concentration of the titration cell components in the sulfur detector is adversely affected by substantial amounts of nitrogen compounds in the sample. So, instead of suggesting that the system be used to detect nitrogen compounds, Eads deliberately seeks to avoid them; it warns against rather than teaches Fine's invention. See *W. L. Gore & Assoc. v. Garlock, Inc.*, 721 F.2d 1540, 1550, 220 USPQ 303, 311 (Fed. Cir. 1983) (error to find obviousness where references "diverge from and teach

away from the invention at hand"). In the face of this, one skilled in the art would not be expected to combine a nitrogen-related detector with the Eads system. Accordingly, there is no suggestion to combine Eads and Warnick.

Likewise, the teachings of Warnick are inconsistent with the claimed invention, to some extent. The Warnick claims are directed to a gas stream from engine exhaust [\*\*10] "continuously flowing the gaseous mixtures into the reaction chamber" to obtain "continuous readouts" of the amount of nitric oxide in the sample. In other words, it contemplates measuring the total amount of nitric oxide in a continuously flowing gaseous mixture of unseparated nitrogen constituents. By contrast, in Fine each [\*\*1075] nitrogen compound constituent of the gaseous sample is retained in the chromatograph for an individual time period so that each exits in discrete, time-separated pulses. \* By this process, each constituent may be both identified by its position in time sequence, and measured. The claimed system, therefore, diverges from Warnick and teaches advantages not appreciated or contemplated by it.

\* The Solicitor argues that the contents of Attachment C of Fine's brief were not before the Board and may not properly be considered here. However, we need not rely on Attachment C. It is merely illustrative of the qualitative separation of nitrogen compounds which occurs in Fine's system. The fact that the various constituents exit at discrete intervals is shown by the specification which was before the Board and which may appropriately be considered on appeal. See, e.g., *Astra-Sjuco, A.B. v. United States Int'l Trade Comm'n*, 67 C.C.P.A. 128, 629 F.2d 682, 686, 207 USPQ 1, 5 (CCPA 1980) (claims must be construed in light of specification).

[\*\*11]

Because neither Warnick nor Eads, alone or in combination, suggests the claimed invention, the Board erred in affirming the Examiner's conclusion that it would have been obvious to substitute the Warnick nitric oxide detector for the Eads sulfur dioxide detector in the Eads system. *ACS Hosp. Sys.*, 732 F.2d at 1575-77, 221 USPQ at 931-33. The Eads and Warnick references disclose, at most, that one skilled in the art might find it obvious to try the claimed invention. But whether a particular combination might be "obvious to try" is not a legitimate test of patentability. *In re Geiger*, 815 F.2d 686, 688, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987); *In re Goodwin*, 576 F.2d 375, 377, 198 USPQ 1, 3 (CCPA 1978).

Obviousness is tested by "what the combined teachings of the references would have suggested to those

of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981). But it "cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching [\*\*12] or suggestion supporting the combination." *ACS Hosp. Sys.*, 732 F.2d at 1577, 221 USPQ at 933. And "teachings of references can be combined *only* if there is some suggestion or incentive to do so." *Id.* Here, the prior art contains none.

Instead, the Examiner relies on hindsight in reaching his obviousness determination. But this court has said, "To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." *W.L. Gore*, 721 F.2d at 1553, 220 USPQ at 312-13. It is essential that "the decisionmaker forget what he or she has been taught at trial about the claimed invention and cast the mind back to the time the invention was made . . . to occupy the mind of one skilled in the art who is presented only with the references, and who is normally guided by the then-accepted wisdom in the art." *Id.* One cannot use [\*\*13] hindsight reconstruction to pick and choose among isolated disclosures in the prior art to depreciate the claimed invention.

#### C. Advantage Not Appreciated by the Prior Art.

The Board erred not only in improperly combining the Eads and Warnick references but also in failing to appreciate that the appealed claims can be distinguished over that combination. A material limitation of the claimed system is that the conversion to nitric oxide occur in the range of 600 degrees C to 1700 degrees C. The purpose of this limitation is to prevent nitrogen from other sources, such as the air, from being converted to nitric oxide and thereby distorting the measurement of nitric oxide derived from the nitrogen compounds of the sample.

The claimed nitric oxide conversion temperature is not disclosed in Warnick. Although Eads describes a preferred temperature of 675 degrees C to 725 degrees C, the purpose of this range is different from that of Fine. Eads requires the 675 degrees C to 725 degrees C range because it affords a temperature low enough to avoid formation of unwanted sulfur trioxide, yet high enough to avoid formation of unwanted sulfides. Fine's temperature [\*1076] range, in contrast, [\*\*14] does not seek to avoid the formation of sulfur compounds or even nitrogen compounds. It enables the system to break down the nitrogen compounds of the sample while avoiding the destruction of background nitrogen gas. There is a partial

overlap, of course, but this is mere happenstance. Because the purposes of the two temperature ranges are entirely unrelated, Eads does not teach use of the claimed range. See *In re Geiger*, 815 F.2d at 688, 2 USPQ2d at 1278. The Board erred by concluding otherwise.

#### D. Unexpected Results.

Because we reverse for failure to establish a *prima facie* case of obviousness, we need not reach Fine's contention that the Board failed to accord proper weight to the objective evidence of unexpected superior results. *Id.*

#### E. The "Flame" Claims.

Claims 62, 68, 69, 79, 85 and 86 relate to the oxygen-rich flame conversion means of the claimed invention. These "flame" claims depend from either apparatus claim 60 or method claim 77. Dependent claims are nonobvious under section 103 if the independent claims from which they depend are nonobvious. [\*\*15] *Hartness Int'l, Inc. v. Simplimatic Eng'g Co.*, 819 F.2d 1100, 1108, 2 USPQ2d 1826, 1831 (Fed. Cir. 1987); *In re Abele*, 684 F.2d 902, 910, 214 USPQ 682, 689 (CCPA 1982); see also *In re Sernaker*, 702 F.2d 989, 991, 217 USPQ 1, 3 (Fed. Cir. 1983). In view of our conclusion that claims 60 and 77 are nonobvious, the dependent "flame" claims are also patentable.

#### Conclusion

The Board's decision affirming the Examiner's rejection of claims 60, 62, 63, 68, 69, 77, 79, 80, 85 and 86 of Fine's application as unpatentable over the prior art under 35 U.S.C. § 103 is

REVERSED.

#### DISSENTBY:

SMITH

#### DISSENT:

SMITH, Circuit Judge, dissenting.

I respectfully dissent. I am of the firm belief that the prior art references, relied upon by the PTO to establish its *prima facie* case of obviousness, in combination teach and suggest Fine's invention to one skilled in the art. Also, I firmly believe that Fine failed to rebut the PTO's *prima facie* case. On this basis, I would affirm the board's determination sustaining the examiner's rejection, pursuant to 35 U.S.C. § 103, of Fine's claims on appeal before [\*\*16] this court.

LEXSEE 958 F.2D 347

IN RE RITA S. JONES, MICHAEL T. CHIRCHIRILLO and JOHNNY L. BURNS

91-1380

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

958 F.2d 347; 1992 U.S. App. LEXIS 2752; 21 U.S.P.Q.2D (BNA) 1941

February 28, 1992, Decided

**SUBSEQUENT HISTORY:** As Corrected March 5, 1992.

**PRIOR HISTORY:** **[\*\*1]** Appeal from: U.S. Patent & Trademark Office, Board of Patent Appeals & Interferences

**DISPOSITION:** REVERSED.

**LexisNexis(R) Headnotes**

**COUNSEL:** Melvyn M. Kassenoff, Sandoz Corporation Patent & Trademark Dept., of East Hanover, New Jersey, argued for appellant. With him on the brief were Gerald D. Sharkin and Richard E. Vila. Also on the brief was Joanne M. Giesser, of Palo Alto, California.

Harris A. Pitlock, Associate Solicitor, of Arlington, Virginia, argued for appellee. With him on the brief was Fred E. McKelvey, Solicitor. Of counsel was Richard E. Schafer, Patent & Trademark Office.

**JUDGES:** Before RICH, ARCHER, and CLEVINGER, Circuit Judges.

**OPINIONBY:** RICH

**OPINION:**

**[\*348]** RICH, *Circuit Judge*.

Rita S. Jones et al. (collectively Jones) appeal from the April 15, 1991 decision of the Patent and Trademark Office (PTO) Board of Patent Appeals and Interferences (Board), Appeal No. 90-1920, sustaining the rejection of claim 1, the only claim of application Ser. No. 07/099,279, titled "The 2-(2'-Aminoethoxy)Ethanol Salt of Dicamba," as unpatentable under 35 USC 103. We conclude that the PTO has not presented a *prima facie* case of obviousness, and therefore *reverse*.

*The Invention*

The claimed invention is a novel salt of 2-methoxy-3,6-dichlorobenzoic acid, **[\*\*2]** which acid is commonly referred to as "dicamba." A known herbicide, dicamba has typically been sold in the form of its known dimethylamine salt.

The sole claim of the application on appeal reads:

1. The 2-(2'-aminoethoxy)ethanol salt of dicamba.

The claimed salt has the following structure:

[SEE STRUCTURE ILLUSTRATION IN ORIGINAL]

**[\*349]** *The Rejection*

Claim 1 stands rejected as obvious in view of the combined teachings of the following references:

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Richter	U.S. Patent No. 3,013,054
Moyle et al.	U.S. Patent No. 3,056,669
Balassa	U.S. Patent No. 3,725,031
Zorayan et al.	88 Chem. Abstracts No. 52300j

Dec. 12, 1961
Oct. 2, 1962
Apr. 3, 1973
1978

Wideman

86 Chem. Abstracts No. 43711a

1977

Richter, which all agree is the closest prior art, discloses dicamba in free acid, ester, and salt forms, for use as a herbicide. Among the salt forms disclosed are substituted ammonium salts, a genus which admittedly encompasses the claimed salt. Richter does not specifically disclose the claimed 2-(2'-aminoethoxy)ethanol salt, however. Most notably, Richter discloses (emphasis and bracketed word ours):

Compositions in which X is substituted ammonium are amine salts of 2-methoxy-3,6-dichlorobenzoic [\*\*3] acid [dicamba] and are prepared by the addition of the free acid to various amines. Typical amines which can be used to prepare such amine salts are dimethylamine, trimethylamine, triethylamine, diethanolamine, triethanolamine, isopropylamine, morpholine, and the like. The resulting products are, respectively the dimethylamino, trimethylamino, triethylamino, diethanolamino, triethanolamino, isopropylamino, and morpholino salts of 2-methoxy-3,6-dichlorobenzoic acid.

Zorayan teaches the amine (H[2]N(CH[2]CH[2]O)[2]H) used to make the claimed salt, as well as the use of that amine in the preparation of surfactants for shampoos, bath preparations, and emulsifiers.

Wideman also teaches the amine disclosed in Zorayan.

The content of the remaining references is unnecessary to our decision.

The Board upheld the examiner's rejection of claim 1 as obvious, finding that the claimed 2-(2'-aminoethoxy)ethanol salt of dicamba and the diethanolamine salt of dicamba specifically disclosed by Richter were "closely related in structure," and that based upon the expectation that "compounds similar in structure will have similar properties," a *prima facie* case of obviousness had arisen. The Board [\*\*4] found that Jones' rebuttal evidence (Rule 132 declarations and data reported in the specification) failed to "compare the claimed subject matter with the closest prior art," and accordingly did not serve to rebut the *prima facie* case. This appeal followed.

#### Analysis

The Solicitor contends that the claimed salt falls within the genus of substituted amine salts of dicamba disclosed by Richter, and that, like Richter's genus, the claimed compound has herbicidal activity. Thus, the Solicitor urges, under the circumstances of this case, (1) the genus/species relationship and (2) the common utility

of the claimed and prior art compounds support the Board's holding of *prima facie* obviousness. Moreover, the Solicitor adds, although the claimed compound is neither a homolog nor a position isomer of those salts specifically disclosed in Richter, it is structurally similar thereto, particularly the diethanolamino salt noted by the Board.

The question of "structural similarity" in chemical patent cases has generated a body of patent law unto itself. n1 Particular types [\*350] or categories of structural similarity without more have, in past cases, given rise to *prima facie* obviousness; [\*\*5] see, e.g., *In re Dillon*, 919 F.2d 688, 692-94, 16 USPQ2d 1897, 1900-02 (Fed. Cir. 1990) (tri-orthoesters and tetra-orthoesters), *cert. denied*, U.S. , 111 S. Ct. 1682 (1991); *In re May*, 574 F.2d 1082, 197 USPQ 601 (CCPA 1978) (stereoisomers); *In re Wilder*, 563 F.2d 457, 195 USPQ 426 (CCPA 1977) (adjacent homologs and structural isomers); *In re Hoch*, 57 C.C.P.A. 1292, 428 F.2d 1341, 166 USPQ 406 (CCPA 1970) (acid and ethyl ester). However, none of these types of structural similarity are involved here. And in any event, this court has previously stated that generalization is to be avoided insofar as specific structures are alleged to be *prima facie* obvious one from the other. *In re Grabiak*, 769 F.2d 729, 731, 226 USPQ 870, 872 (Fed. Cir. 1985).

n1 See generally Helmuth A. Wegner, "Prima Facie Obviousness of Chemical Compounds," 6 *Am. Pat. L. Assoc. Q. J.* 271 (1978).

[\*\*6]

On the basis of the record before us, we cannot sustain the Board's conclusion that the claimed salt and the diethanolamino salt disclosed by Richter are so "closely related in structure" as to render the former *prima facie* obvious in view of the latter. The claimed salt is a primary amine with an ether linkage. The diethanolamino salt disclosed by Richter is a secondary amine, without an ether linkage:

[SEE ILLUSTRATION IN ORIGINAL]

In addition, the only substituted ammonium salt of dicamba expressly disclosed by Richter having an ether linkage is the morpholino salt, which is *cyclic* in structure:

[SEE STRUCTURE ILLUSTRATION IN ORIGINAL]

958 F.2d 347, \*, 1992 U.S. App. LEXIS 2752, \*\*;  
21 U.S.P.Q.2D (BNA) 1941

The claimed salt is, plainly, acyclic; i.e., linear. Lastly, while the isopropylamino salt disclosed by Richter is a primary amine, as is the claimed salt, its iso- structure is quite different:

[SEE STRUCTURE ILLUSTRATION IN ORIGINAL]

The lack of close similarity of structure is not negated by the fact that the claimed salt is a member of Richter's broadly disclosed genus of substituted ammonium salts of dicamba. The Solicitor contends that "the relative size of the genus disclosed by the prior art would not appear to be a controlling [\*\*7] factor in determining whether a *prima facie* case of obviousness exists for a species encompassed within the described genus," citing *Merck & Co. v. Biocraft Labs., Inc.*, 874 F.2d 804, 806-09, 10 USPQ2d 1843, 1845-48 (Fed. Cir.), *cert. denied*, 493 U.S. 975, 110 S. Ct. 498, 107 L. Ed. 2d 502, 110 S. Ct. 498 (1989). We decline to extract from *Merck* the rule that the Solicitor appears to suggest--that regardless of how broad, a disclosure of a chemical genus renders obvious any species that happens to fall within it. In *Merck*, at issue on appeal was whether claims to a composition of two diuretics, amiloride and hydrochlorothiazide, present in a particular "medically synergistic" weight ratio, would have been obvious in view of a specific prior art disclosure of amiloride in combination with hydrochlorothiazide, one of 1200 such combinations disclosed in the prior art reference. *Id.* at 806, 10 USPQ2d at 1845. Based on the facts before it, including evidence at trial that the experimentation needed to arrive at the claimed dosage was "nothing more than routine," *id.* at 809, 10 USPQ2d at 1847, [\*\*8] the court held that the claimed invention would have been obvious. In contrast, though Richter discloses the potentially infinite genus of "substituted ammonium salts" of dicamba, and lists several such salts, the salt claimed here is not specifically disclosed. Nor, as we have explained above, is the claimed salt sufficiently similar in structure to those specifically disclosed in Richter as to render it *prima facie* obvious. Every case, particularly those raising the issue of obviousness under section 103, must necessarily be decided upon its own facts.

[\*351] The Solicitor points out that, given the breadth of forms of dicamba (free acid, ester, or salt) disclosed by Richter as having herbicidal utility, one of

ordinary skill in the art would appreciate that the dicamba group has significance with respect to imparting herbicidal activity to dicamba compounds. Thus, the Solicitor contends, one skilled in the art would have been motivated to use, with dicamba, substituted ammonium salts made from a known amine, such as the amine disclosed by Zorayan and Wideman, and would have expected such a salt to have herbicidal activity. Before the PTO may combine the disclosures of two or more [\*\*9] prior art references in order to establish *prima facie* obviousness, there must be some suggestion for doing so, found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598-99 (Fed. Cir. 1988). We see no such suggestion in Zorayan, which is directed to shampoo additives, nor in Wideman, which teaches that the amine used to make the claimed compound is a byproduct of the production of morpholine. Nor does the broad disclosure of Richter fill the gap, for the reasons discussed above.

Conspicuously missing from this record is any evidence, other than the PTO's speculation (if it be called evidence) that one of ordinary skill in the herbicidal art would have been motivated to make the modifications of the prior art salts necessary to arrive at the claimed 2-(2'-aminoethoxy)ethanol salt. *See Grabiak*, 769 F.2d at 731-32, 226 USPQ at 872 ("In the case before us there must be adequate support in the prior art for the [prior art] ester/[claimed] thioester change in structure, in order to complete the PTO's *prima* [\*\*10] *facie* case and shift the burden of going forward to the applicant."); *In re Lahu*, 747 F.2d 703, 705, 223 USPQ 1257, 1258 (Fed. Cir. 1984) ("The prior art must provide one of ordinary skill in the art the motivation to make the proposed molecular modifications needed to arrive at the claimed compound.")

#### Conclusion

We conclude that the PTO did not establish a *prima facie* case of obviousness, and thus did not shift to Jones the burden of coming forward with unexpected results or other objective evidence of non-obviousness. Accordingly, the decision of the Board is

REVERSED.



LEXSEE 733 F.2D 900

IN RE LUCAS S. GORDON and KARL M. SUTHERLAND

Appeal No. 83-1281

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

733 F.2d 900; 1984 U.S. App. LEXIS 15015; 221 U.S.P.Q. (BNA) 1125

May 10, 1984

**PRIOR HISTORY: [\*\*1]**

Appealed from: United States Patent and Trademark Office Board of Appeals. Serial No. 124,312.

("board") affirming the examiner's rejection of appellants' claims n1 1-3 and 5-7 as unpatentable under 35 U.S.C. § 103. We reverse.

**DISPOSITION:**

REVERSED.

n1 In application Serial No. 124,312, filed February 25, 1980, for a "Blood Filter."

**LexisNexis(R) Headnotes**

**COUNSEL:**

James W. Geriak, of Los Angeles, California, argued, for Appellants. With him on the brief was Bradford J. Duft.

John F. Pitrelli, of Arlington, Virginia, argued, for Appellee. With him on the brief were Joseph F. Nakamura, Solicitor and John W. Dewhirst, Associate Solicitor.

**JUDGES:**

Bennett, Circuit Judge, Skelton, Senior Circuit Judge, and Miller, Circuit Judge.

**OPINIONBY:**

MILLER

**OPINION:**

[\*900] MILLER, Circuit Judge.

This appeal is from the decision of the United States Patent and Trademark Office ("PTO") Board of Appeals

**THE INVENTION**

Appellants claim a "blood filter assembly" used during surgery and other medical procedures involving the handling of blood to remove clots, bone debris, [\*\*2] tissue, or other foreign materials from blood before it is returned to a patient's body. Unlike blood filter assemblies widely used in the prior art, the device of the present invention permits both entry of the blood into, and ultimate discharge of the blood out of, the *bottom* end of the filter assembly, as shown below. n2

n2 Extraneous numbers have been removed from this and the subsequent drawing for clarification.

[\*901] [SEE FIG. 1 IN ORIGINAL]

The blood filter assembly comprises a shell 1 provided with blood inlet 3 and blood outlet 4. Between the blood inlet and the blood outlet is filter medium 6 positioned within the filter medium core 7.

The location of blood inlet 3 is such that the incoming blood is directed along a spirally upward path by the inner wall of the shell. Further, the location of the blood inlet at the bottom end of the filter assembly facilitates the removal of gas bubbles by allowing them to rise upwardly out of the blood. The gas bubbles so removed are released

[\*\*3] from the blood filter assembly by means of a gas vent 5 located in the region of the top end of the assembly.

Independent claim 1, from which the other appealed claims depend, is illustrative:

Blood filter assembly comprising:

- a. a shell having a first top end and a second bottom end,
  - b. a blood inlet located in the region of said bottom end and opening into said bottom end,
  - c. a blood outlet located in the region of said bottom end,
  - d. a gas vent located in the region of said top end, and
  - e. a blood filter medium located between said blood inlet and said blood outlet,
- said blood inlet being located and configured in a manner capable of directing incoming blood in a generally spiral path within said shell.

Claims 2, 3, and 5-7 further define the shape of the shell, the shape of the filter medium, and the nature of the material used as the filter medium.

#### PRIOR ART

The sole reference relied upon by the board is United States Patent No. 1,175,948, issued March 21, 1916, to French. French discloses a liquid strainer for removing dirt and water from gasoline and other light oils. As shown below, the inlet 4 and outlet 5 of the French device are both [\*\*4] at the top end of the device.

[SEE ILLUSTRATION IN ORIGINAL]

[\*902] A continuous helical tooth or thread 8 is formed integral with the inner wall of shell 1 and imparts to the incoming liquid a whirling motion, which gives the liquid a scouring action to help clean the surface of a metal screen filter 21 and guides unwanted dirt and water downwardly into a pocket 9 in the bottom of the shell. A pair of shelves 10 and 11, projecting inwardly and downwardly from the inner wall of the shell, further assists the entrance of dirt and water into the pocket 9 and prevents their being drawn back into the main chamber 12. The reference expressly states, "gravity assists in the separation of heavier oils or water." A pet-cock 13, projecting vertically downward from the bottom of the pocket is used to remove the collected dirt and water

periodically. The top of the liquid strainer is completely closed by gland 3 except for the inlet and outlet openings.

#### BOARD OPINION

The board held that the appealed claims were drawn to an apparatus which "would have at least been rendered *prima facie* obvious to one of ordinary skill in the art by the apparatus disclosed in French." [\*\*5] The board's reasoning was that it would have been obvious to turn the French device upside down to have both the inlet and outlet at the bottom, rather than at the top; and to employ French's "pet-cock" as the claimed "gas vent." In the board's opinion, no patentable distinction was created by viewing French's apparatus from one direction and the claimed apparatus from another.

#### ANALYSIS

We are persuaded that the board erred in its conclusion of *prima facie* obviousness. The question is not whether a patentable distinction is created by viewing a prior art apparatus from one direction and a claimed apparatus from another, but, rather, whether it would have been obvious from a fair reading of the prior art reference as a whole to turn the prior art apparatus upside down. French teaches a liquid strainer which relies, at least in part, upon the assistance of gravity to separate undesired dirt and water from gasoline and other light oils. Therefore, it is not seen that French would have provided any motivation to one of ordinary skill in the art to employ the French apparatus in an upside down orientation. The mere fact that the prior art could be so modified would not have made [\*\*6] the modification obvious unless the prior art suggested the desirability of the modification. See *Carl Schenck, A. G. v. Nortron Corp.*, 713 F.2d 782, 787, 218 U.S.P.Q. (BNA) 698, 702 (Fed. Cir. 1983), and *In re Sernaker*, 702 F.2d 989, 995-96, 217 U.S.P.Q. (BNA) 1, 6-7 (Fed. Cir. 1983), both citing *In re Imperato*, 486 F.2d 585, 587, 179 U.S.P.Q. (BNA) 730, 732 (CCPA 1973).

Indeed, if the French apparatus were turned upside down, it would be rendered inoperable for its intended purpose. The gasoline to be filtered would be trapped in pocket 9, and the water French seeks to separate would flow freely out of the outlet 5. Further, unwanted dirt would build up in the space between the wall of shell 1 and screen 21, so that, in time, screen 21 would become clogged unless a drain valve, such as pet-cock 13, were re-introduced at the new "bottom" of the apparatus. See *In re Schulpen*, 55 C.C.P.A. 960, 390 F.2d 1009, 1013, 157 U.S.P.Q. (BNA) 52, 55 (CCPA 1968). In effect, French teaches away from the board's proposed modification.

Because the PTO has failed to establish a *prima facie* case of obviousness, the rejection of claims 1-3 and 5-7 as

733 F.2d 900, \*, 1984 U.S. App. LEXIS 15015, \*\*;  
221 U.S.P.Q. (BNA) 1125

unpatentable under 35 [\*\*7] U.S.C. § 103 must be  
*reversed*. n3

it is unnecessary to reach other arguments raised  
by appellants.

n3 Because our holding that the PTO has  
failed to establish a *prima facie* case is dispositive,

REVERSED.

LEXSEE 800 F.2D 1091

In re MERCK & CO., INC.

No. 85-2740

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

800 F.2d 1091; 1986 U.S. App. LEXIS 20333; 231 U.S.P.Q. (BNA) 375

September 8, 1986

**PRIOR HISTORY:** [\*\*1]

Appealed from: U.S. Patent and Trademark Office Board of Patent Appeals and Interferences.

**DISPOSITION:**

AFFIRMED.

**LexisNexis(R) Headnotes**

**COUNSEL:**

Charles M. Caruso, of Merck & Co., Inc., Rahway, New Jersey, Argued for Appellant. With him on the brief was Nels T. Lippert, of Fitzpatrick, Cella, Harper & Scinto, New York, New York. Of Counsel were Mario A. Monaco and Michael C. Sudol, Jr., of Merck & Co., Inc., Rahway, New Jersey.

Richard E. Schafer, Associate Solicitor, Office of the Solicitor, Arlington, Virginia, argued for Appellee. With him on the brief were Joseph F. Nakamura, Solicitor, and Fred E. McKelvey, Deputy Solicitor.

Donald R. Dunner, of Finnegan, Henderson, Farabow, Garrett & Dunner, Washington, District of Columbia, argued for Intervenor Biocraft Laboratories, Inc. With him on the brief was Robert D. Bajefsky and Carol P. Einaudi, of Finnegan, Henderson, Farabow, Garrett & Dunner, Washington, District of Columbia. Of Counsel was Beryl L. Synder, of Biocraft Laboratories, Inc., Elmwood Park, New Jersey.

**JUDGES:**

Davis, Baldwin and Archer, Circuit Judges. Baldwin, Circuit Judge, dissenting.

**OPINIONBY:**

DAVIS

**OPINION:**

[\*1092] DAVIS, Circuit Judge.

This is an appeal from a final decision [\*\*2] of the United States Patent and Trademark Office (PTO) Board of Patent Appeals and Interferences (Board), sustaining the rejection of claims 1 through 3 in the reexamination application n1 of U.S. Patent No. 3,428,735 n2 (the '735 patent) as unpatentable under 35 U.S.C. § 103. We affirm.

n1 *Ex Parte Merck and Co.*, Reexamination No. 90/000264, Appeal No. 607-66 (PTO Bd. Pat. App. & Int., May 28, 1985), JA p. 7. In its opinion the Board expressly adopted the reasonings in its earlier reissue (for the '735 patent) opinions, *Ex Parte Edward L. Engelhardt*, Reissue Application No. 776,464, Appeal No. 424-40 (PTO Bd. Pat. App., Apr. 23, 1980), JA p. 13 and *Ex Parte Edward L. Engelhardt*, Reissue Application No. 776,464, Appeal No. 480-01 (PTO Bd. Pat. App., Feb. 25, 1982), JA p. 23.

n2 U.S. Patent No. 3,428,735, issued to Edward L. Engelhardt on February 18, 1969, was based on patent application Serial No. 662,907 filed August 24, 1967 as a continuation-in-part of patent application Serial No. 855,981 filed Nov. 30, 1959.

[\*\*3]

## I. BACKGROUND

### A. *The Invention*

The invention is directed to a method of treating human mental disorders; the method involves treating depression in humans by the oral administration of 5-(3-dimethylaminopropylidene)dibenzo[a, d][1, 4]cycloheptadiene (commonly known as and hereafter referred to as "amitriptyline"), or the hydrochloride or hydrobromide salts thereof, in a particular dosage range. Amitriptyline has the following chemical structure:

[SEE ILLUSTRATION IN ORIGINAL]

[\*1093] As representative of the invention, claim 1 reads:

1. A method of treating human mental disorders involving depression which comprises orally administering to a human affected by depression 5-(3-dimethylaminopropylidene) dibenzo[a, d] [1, 4]cycloheptadiene or its non-toxic salts in daily dosage of 25 to 250 mg. of said compound.

Remaining claims 2 and 3 are dependent from claim 1 and add limitations pertaining to the use of the hydrochloride and hydrobromide salts of amitriptyline, respectively.

### B. *Related Proceedings*

On March 10, 1977 an application, Serial No. 776,464 (the '464 application), was filed for reissue of the [\*4] '735 patent. n3 All the claims of the '464 application were finally rejected by the examiner under section 102 of title 35, United States Code, and alternatively under section 103 of that title. Subsequently, an appeal (Appeal No. 424-40) was taken to the Board n4 which affirmed the examiner's rejections. Additionally, the Board entered a new rejection under 35 U.S.C. § 103 over a combination of references not previously cited by the examiner. In accordance with 37 C.F.R. § 1.196(b) (1985) n5, appellant elected reconsideration of the '464 application by the examiner. The examiner maintained the rejection entered by the Board; in Appeal No. 480-01, the Board affirmed the examiner. The Board's decision was appealed to the Court of Customs and Patent Appeals (CCPA). Upon the motion of the Commissioner of Patents and Trademarks and on the authority of *In re Dien*, 680 F.2d 151, 214 U.S.P.Q. (BNA) 10 (CCPA 1982), the appeal was dismissed for lack of subject matter jurisdiction. n6

n3 The reissue application was filed as a "no defect" type reissue under the then existing 37 C.F.R. § 1.175(a)(4) (1980). That provision has now been repealed. [\*5]

n4 At that time, the Board of Patent Appeals and Interferences was called the Board of Patent Appeals.

n5 37 C.F.R. § 1.196(b) provides that when the Board of Appeals determines a new ground of rejection, the appellant may

- (1) after submitting appropriate amendments or showing of facts, have the matter reconsidered by the examiner;
- (2) waive reconsideration before the examiner and have the case reconsidered by the Board; or
- (3) treat the decision, including the new ground of rejection, as a final decision in the case.

n6 *See In the Matter of the Application of Edward L. Engelhardt*, Appeal No. 82-611 (CAFC Oct. 28, 1982) (order granting motion to dismiss).

The reissue application was protested by Biocraft Laboratories, Inc. (Biocraft), intervenor in the current appeal. Biocraft is also the plaintiff in a related litigation pending in the U.S. District Court for the District of New Jersey in which the validity and infringement of the '735 patent is in issue. *See Biocraft Laboratories Inc. v. Merck & Co.*, Civil Action No. 77-0693 (D.N.J.). The district [\*6] court has stayed further action in that case pending the final outcome of the pending PTO proceedings.

### C. *Reexamination Proceeding*

Following dismissal of the reissue appeal by the CCPA, Merck & Co., Inc. (Merck), the assignee of the '735 patent, filed for and was granted a request for reexamination of the patent. As a result of prosecution before the examiner, claims 1 through 3 of the reexamination application were finally rejected under 35 U.S.C. § 102 as anticipated by prior art references; the claims were also rejected under 35 U.S.C. § 103 as being obvious over references cited by the Board in its new ground of rejection entered during the initial reissue appeal. Finding the '735 patent to be entitled to the benefit

of the November 30, 1959 filing date of its parent application, Serial No. 855,981, the Board reversed the section 102 rejection because the effective filing date of the application antedated all the references cited therein. The Board, however, sustained the rejection for obviousness under section 103. Expressly adopting the reasonings of its earlier reissue opinions, the Board took the position [\*\*7] that in view of the prior art, in combination, [\*1094] and a thorough knowledge of the investigative techniques used in the medicinal chemical art, the skilled artisan would have expected the known tricyclic compound, amitriptyline, to be useful as an antidepressant.

#### D. The References

The references relied upon by the Board were:

- (1) Rey-Bellet et al. (Rey-Bellet) U.S. Patent No. 3,384,663, May 21, 1968 (application filed Mar. 27, 1959);
- (2) Kuhn, *Schweizerische Medizinische Wochenschrift*, Vol. 87, No. 35-36, pp. 1135-1140 (Aug. 1957);
- (3) Lehman et al. (Lehman), *Canadian Psychiatric Association Journal*, "The Treatment of Depressive Conditions with Imipramine (G 22355)", vol. 3, No. 4, pp. 155-164 (Oct. 1958);
- (4) Friedman, *First Symposium On Chemical Biological Correlation*, "Influence of Isosteric Replacements Upon Biological Activity", pp. 296-358 (May 1950);
- (5) Burger, *Journal of Chemical Education*, "Rational Approaches to Drug Structure", Vol. 33, No. 8, pp. 362-372 (Aug. 1956);
- (6) Petersen et al. (Petersen), *Arzneimittel-Forschung*, Vol. 8, No. 7, pp. 395-397 (1958);
- (7) Roche Research Report No. 43,162, pp. 1-9 (Nov. [\*\*8] 1957);
- (8) Roche Research Report No. 43,169, pp. 1-8 (Apr. 1958);
- (9) Roche Research Report No. 52,195, pp. 1-13 (Sept. 1958) (collectively called the "Roche Reports").

The Rey-Bellet patent disclosed amitriptyline and its hydrochloride salt. Properties of amitriptyline taught by the reference included a "manifold activity upon the central nervous system," as well as pharmacological and

medicinal properties, such as "narcosis-potentiating, adrenolytic, sedative, antihistaminic, antiemetic, antipyretic and hypothermic." Rey-Bellet did not disclose or otherwise teach that amitriptyline possessed antidepressive properties.

The Kuhn publication disclosed the compound, imipramine, and taught that the compound was a very effective antidepressant in humans. Imipramine has the chemical structure

[SEE ILLUSTRATION ON ORIGINAL]

and differs from the structure of amitriptyline only in the replacement of the unsaturated carbon atom in the center ring with a nitrogen atom. Kuhn taught a recommended dosage of 75-150 mg per day -- possibly 200-250 mg if the smaller doses proved ineffective.

The Lehman publication disclosed the results of a Canadian study of the effects [\*\*9] of imipramine on the symptoms of depression in humans. This article confirmed, for the most part, the teachings of the Kuhn article.

The object of the Friedman publication was "to survey the history of isosterism, to classify the varieties of isosteric replacements which are recorded in the literature, and to note the influence of these replacements on the biological activity of compounds." Friedman defined isosteres as atoms, ions or molecules in which the peripheral layers of electrons can be considered identical. Compounds which fit this broad definition and exhibit the same biological activity were termed "bioisosteric." Further, with respect to the medicinal chemists' use of the theory of "isosteric replacement" or "bio-isosteric replacement" as a tool to predict the properties of compounds, Friedman commented that:

to the synthetic organic chemist interested in medicinal chemistry, every physiologically active compound of known structure is a challenge -- a challenge either to better it, or perhaps merely to equal it. . . .

There are numerous ways of attacking such a problem. . . . One of the methods which has been used frequently, very [\*1095] often with success, [\*\*10] is that of isosteric replacement. The examples of this type of replacement in the literature are very numerous, and the fruitful results in the fields of sulfonamides, antimetabolites, and antihistamines are well known.

Friedman at page 296. Finally, Friedman disclosed various atoms or groups of atoms as bioisosteric, including the interchange of oxygen and the unsaturated carbon atom which often resulted in similar biological activity. Friedman, however, did not disclose or otherwise teach as bioisosteric the interchange of the nitrogen and unsaturated carbon atoms.

The Burger publication also discussed the theory of "bioisosterism" and its usefulness in designing new drugs based upon the knowledge of "lead" compounds.

The Petersen publication taught, *inter alia*, the properties of chlorpromazine (a phenothiazine derivative) and chlorprothixene (a 9-amino-alkylene-thioxanthene derivative), these compounds having the following structural formulas:

[SEE ILLUSTRATION ON ORIGINAL]

Petersen concluded that, when the nitrogen atom located in the central ring of the phenothiazine compound is interchanged with an unsaturated carbon atom as in the corresponding [\*\*11] 9-amino-alkylene-thioxanthene compound, the pharmacological properties of the thioxanthene derivatives resemble very strongly the properties of the corresponding phenothiazines. Using the theory of isosteric replacement, Petersen predicted this similarity in properties:

Structural chemical considerations permitted the expectation that the 9-amino- alkylene-thioxanthenes . . . would show great similarity to the corresponding phenothiazines. They should be more similar in their behavior to that of the phenothiazines than the saturated 9-amino- alkyl-thioxanthenes. From the physical point of view the ++-electron distributions (sites of ++-electrons) are almost the same in the phenothiazine derivatives and in the 9-aminoalkylene-thioxanthenes with their stabilizing conjugated double linkage between C9 in the thioxanthene ring and the first C-atom of the side chain.

Petersen at page 3. The compounds were disclosed as having a strong central depressive, i.e., tranquilizing, action in animals.

The Roche Reports revealed the results from tests comparing the pharmacological properties of amitriptyline and imipramine. The reports indicated that the two compounds were [\*\*12] very similar in a variety of properties, including their action as tranquilizers

having narcosis-potentiating effects. Because of this similarity and because amitriptyline and imipramine were structurally related, Roche scientists concluded that amitriptyline should be clinically tested for depression alleviation -- a known property of imipramine. In the pharmacological guideline for the clinical testings of amitriptyline (which was labelled Roche Preparation Ro 4-1575), the Roche Reports stated that

it is to be noted that a "tofranil-like effect" is already to be expected by using a dose 1/4 - 1/2 that of Tofranil. Side effects which can appear . . . are sedative and atropine-like effects, such as appear also with Tofranil. n7

n7 Tofranil is a tradename used for imipramine.

We must decide in this appeal whether appellant's invention would have been *prima facie* obvious over the available prior art of record; and, if so obvious, whether [\*1096] the *prima facie* case has been rebutted [\*\*13] by evidence of unexpected results.

## II. DISCUSSION

In its opinion on this problem, the Board expressly followed the guidelines of *Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 148 U.S.P.Q. (BNA) 459, 466-67, 15 L. Ed. 2d 545, 86 S. Ct. 684 (1966), and made findings on factual inquiries specifically set forth in that decision. These factual findings must be accepted unless they are clearly erroneous. *In re Wilder*, 736 F.2d 1516, 1520, 222 U.S.P.Q. (BNA) 369, 372 (Fed. Cir. 1984), *cert. denied*, 469 U.S. 1209, 105 S. Ct. 1173, 84 L. Ed. 2d 323 (1985); *In re De Blauwe*, 736 F.2d 699, 703, 222 U.S.P.Q. (BNA) 191, 193 (Fed. Cir. 1984); *accord Stock Pot Restaurant, Inc. v. Stockpot, Inc.*, 737 F.2d 1576, 1578-79, 222 U.S.P.Q. (BNA) 665, 666-67 (Fed. Cir. 1984). In this case we do not hold the Board's factual findings -- as to the scope and content of the prior art, the differences between the prior art and the claims at issue, and the level of ordinary skill in the art -- to be clearly erroneous and [\*\*14] accordingly we have followed them in our statement of the prior art and we now follow them in our analysis of the legal issue of obviousness.

*Prima Facie Obviousness:* The prior art taught that amitriptyline and imipramine are both psychotropic drugs which react on the central nervous system and which were known in the art prior to the time of appellant's invention. Imipramine was known to possess antidepressive properties in humans. While amitriptyline was known to

possess psychotropic properties such as sedative and narcosis-potentiating properties, the drug was not known to be an antidepressant. However, the prior art has shown that imipramine and amitriptyline are unquestionably closely related in structure. Both compounds are tricyclic dibenzo compounds and differ structurally only in that the nitrogen atom located in the central ring of imipramine is interchanged with an unsaturated carbon atom in the central ring of amitriptyline. To show obviousness, it was necessary to determine from knowledge already available in the art at the time of appellant's invention that one skilled in the medicinal chemical art would have expected amitriptyline, like imipramine, to be useful [\*\*15] in the treatment of depression in humans. *In re Papesch*, 50 C.C.P.A. 1084, 315 F.2d 381, 137 U.S.P.Q. (BNA) 43 (CCPA 1963).

As found by the Board, the Roche Reports recognized the structural relationship between amitriptyline and imipramine and concluded that amitriptyline should be tested for its anti-depressant activities. In fact, the Roche Reports expressly stated that amitriptyline was expected to resemble imipramine clinically in its depression alleviation effects.

"Structural similarity, alone, may be sufficient to give rise to an expectation that compounds similar in structure will have similar properties." *In re Payne*, 606 F.2d 303, 313, 203 U.S.P.Q. (BNA) 245, 254 (CCPA 1979). However, the Board did not rest its conclusion of obviousness on structural similarity alone. Rather, the Board further recognized that in attempting to predict the biological activities of a drug, a skilled medicinal chemist would not proceed randomly, but would base his attempts on the available knowledge of prior research techniques, and literature used in his field. [\*\*16] The prior art showed that one such technique was "bioisosteric replacement" or the theory of bioisosterism -- where the substitution of one atom or group of atoms for another atom or group of atoms having similar size, shape and electron density provides molecules having the same type of biological activity. Finding that the Friedman, Burger and Petersen references taught that bioisosterism was commonly used by medicinal chemists prior to 1959 in an effort to design and predict drug activity, the Board concluded that one of ordinary skill in the arts would have been aware of this technique at the time of appellant's invention. n8 Further, the Board [\*1097] found that Petersen taught as bioisosteric the interchange of the nitrogen and unsaturated carbon atoms -- the precise structural difference between imipramine and amitriptyline. n9

n8 Appellant submitted the declaration of Dr. Paul N. Craig, an experienced medicinal chemist,

JA p. 372. His view was that the concept of bioisosterism could not be used in 1959 to predict the antidepressant effects in amitriptyline or the pharmacological differences between imipramine and amitriptyline. Dr. Craig stated:

In my opinion "isosterism" in 1959 afforded no basis for predicting the specific pharmaceutical utility in humans, and it is my belief that that is still true today. . . . I do not believe the carryover of tranquilizing activity from chlorpromazine to chlorprothixene afforded a reasonable basis for predicting the carryover of antidepressant properties from imipramine to amitriptyline.

Affidavit of Paul N. Craig, JA, pp. 374-75.

Plainly the Board was not clearly erroneous in discounting that testimony. There was independent evidence in the record to the contrary. The Friedman, Burger and Petersen references recognize that concept as a means of predicting biological properties in isosterically-related compounds prior to 1959. [\*\*17]

n9 Petersen even went so far as to suggest that the apparent bioisosteric relationship between the interchange of the nitrogen and unsaturated carbon atoms led to the design of chlorprothixene in the expectation that the compound would share the same biological activity as chlorpromazine. See Petersen, *supra*, at p. 395.

We see no clear error in the Board's determination as to the teachings of the prior art references, in combination. In view of these teachings, which show a close structural similarity and a similar use (psychotropic drugs) between amitriptyline and imipramine, one of ordinary skill in the medicinal chemical arts, possessed of the knowledge of the investigative techniques used in the field of drug design and pharmacological predictability, would have expected amitriptyline to resemble imipramine in the alleviation of depression in humans. Accordingly, we agree with the Board that appellant's invention was *prima facie* obvious over the prior art of record.

In traversing the Board's decision of obviousness, appellant has urged that the Board's decision was premised [\*\*18] on an impermissible "obvious to try"



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standard. Appellant contends that there was no motivation in the prior art to arrive at appellant's invention. "Obvious to try is not the standard of 35 U.S.C. § 103." *In re Antonie*, 559 F.2d 618, 620, 195 U.S.P.Q. (BNA) 6, 8 (CCPA 1977) (emphasis omitted). Rather, the test is whether the references, taken as a whole, would have suggested appellant's invention to one of ordinary skill in the medicinal chemical arts at the time the invention was made. *In re Simon*, 59 C.C.P.A. 1140, 461 F.2d 1387, 1390, 174 U.S.P.Q. (BNA) 114, 116 (CCPA 1972). Clearly, amitriptyline and imipramine, both known psychotropic drugs, are closely structurally related. The expectation that the similar structures would behave similarly was suggested in the Roche Reports. In combination with those teachings, the prior art teaching that the precise structural difference between amitriptyline and imipramine involves a known bioisosteric replacement provides sufficient basis for the required expectation of success, without [\*\*19] resort to hindsight. n10 Obviousness does not require absolute predictability. *In re Lamberti*, 545 F.2d 747, 750, 192 U.S.P.Q. (BNA) 278, 280 (CCPA 1976). Only a reasonable expectation that the beneficial result will be achieved is necessary to show obviousness. *In re Longi*, 759 F.2d 887, 897, 225 U.S.P.Q. (BNA) 645, 651 (Fed. Cir., 1985).

n10 The teachings of the Roche Reports as well as the Petersen reference distinguish this case from *In re Grabiak*, 769 F.2d 729, 731, 226 U.S.P.Q. (BNA) 870, 871 (Fed. Cir. 1985) ("there is no motive in the cited art to make the modification required to arrive at appellants' compounds").

We also find untenable appellant's arguments that Petersen teaches away from appellant's invention. Non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of [\*\*20] references. *In re Keller*, 642 F.2d 413, 425, 208 U.S.P.Q. (BNA) 871, 881 (CCPA 1981). Thus, Petersen must be read, not in isolation, but for what it fairly teaches in combination with the prior art as a whole. That teaching is that the interchange of the nitrogen and the unsaturated carbon atoms is isosteric and compounds so modified are [\*\*1098] expected to possess similar biological properties.

Neither are we persuaded by appellant's contention that the Board erred in relying on the contemporaneous independent invention of others to support its holding of obviousness. n11 As we have said earlier, the teachings of the prior art references in combination adequately support the Board's conclusion. However, the additional,

although unnecessary, evidence of contemporaneous invention is probative of "the level of knowledge in the art at the time the invention was made." *In re Farrenkopf*, 713 F.2d 714, 720, 219 U.S.P.Q. (BNA) 1, 6 (Fed. Cir. 1983).

N11 *Ex Parte Edward L. Engelhardt*, Appeal No. 424-40, *supra* note 1, at pp. 23-24, JA pp. 22(1)-22(m), where the Board indicated that evidence before it revealed that four other groups of inventors independently and contemporaneously discovered amitriptyline's antidepressant properties using reasoning based on a thorough knowledge of investigative techniques, which included the concept of isosterism, used in the medicinal art area.

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*Unexpected Results*: A prima facie case of obviousness can be rebutted by evidence of unexpected results. *In re Davies*, 475 F.2d 667, 670, 177 U.S.P.Q. (BNA) 381, 384 (CCPA 1973). In rebuttal of the PTO's prima facie case appellant has asserted that, as compared to imipramine, amitriptyline unexpectedly has a more potent sedative and a stronger anticholinergic effect. In support of this contention, appellant had relied on an affidavit of Dr. Joseph J. Schildkraut, n12 a psychiatrist and a Professor of Psychiatry at Harvard, and also on a published record of a symposium of physicians and psychiatrists concerned with the treatment of the depressed patient. n13

n12 Affidavit of Joseph J. Schildkraut, JA p. 366.

n13 Symposium, *Depression Today -- Experts Answer Your Questions*, JA p. 309.

Dr. Schildkraut's affidavit recognizes some pharmacological differences between amitriptyline and imipramine [\*\*22] including the fact that amitriptyline is a more potent sedative and has a stronger anticholinergic effect than imipramine. Further, Dr. Schildkraut notes that depressed patients have responded differently to amitriptyline and imipramine, some responding to one and not the other or more favorably to one than to the other. For the most part, the record of the cited symposium confirms the differences noted in the Schildkraut affidavit. n14 That record also counseled practicing physicians on choosing from the spectrum of tricyclic antidepressants (a term which includes amitriptyline and imipramine) the particular drug useful for an individual patient.

n14 Dr. Schildkraut was a member of the symposium.

After a careful consideration of all the evidence, we are persuaded that the Board did not err in determining that the alleged unexpected properties of amitriptyline are not so unexpectedly different from the properties of imipramine, the closest prior art, as to overcome the prima facie showing of obviousness. The [\*\*23] prior art of record clearly taught that amitriptyline was a known sedative. n15 The evidence before us (which was, of course, before the Board) further revealed that all tricyclic antidepressant drugs, in general, possess the secondary properties of sedative and anticholinergic effects. Specifically, the record showed that during the prosecution of the reissue application, appellant submitted an article entitled "Using the tricyclic antidepressants" which included a table comparing the properties of known tricyclic antidepressant drugs. n16 Included in these properties were sedative and anticholinergic effects of the known antidepressants. n17 [\*1099] Thus, it appears that the alleged difference in properties between amitriptyline and imipramine is a matter of degree rather than kind. Moreover, as to the sedative effects, the article revealed only a slight difference between the two compounds. Amitriptyline was characterized as "highly sedative" while imipramine was only "somewhat less [sedative] than amitriptyline." n18 Regarding the anticholinergic effect, the article showed that both drugs have anticholinergic effects but to a different degree. These are not truly unexpected [\*\*24] results. The Board found in one of its reissue opinions (incorporated in the reexamination decision now on appeal): "in regard to the sedative and anticholinergic properties of amitriptyline, we are not convinced that the side effects of this material [amitriptyline] are significantly or unexpectedly different from the level of those properties exerted by the closest prior art antidepressant, imipramine." n19

n15 Rey-Bellet, *supra*, col. 2, line 16.

n16 *Patient Care*, "Using the Tricyclic Antidepressants," pp. 28-33, 35-36, 39-40, 43-45, 49-52, 57-58, 63-64, 67-68, 71, 73-76, 78, 81, 84-85 (May 15, 1979); *see also* Commission's Appendix, pp. CA 17-45.

n17 *See also* the Symposium, *Depression Today -- Experts Answer Your Questions*, *supra* note 13, at p. 315, where Dr. Hollister indicates that when choosing from the spectrum of tricyclic antidepressant drugs, the choice is based on three pharmacological actions including (1) the amount

of sedation (2) the amount of anticholinergic effect and (3) the nature of the drugs in primarily blocking the uptake of serotonin or norepinephrine. [\*\*25]

n18 *Patient Care*, "Using the Tricyclic Antidepressants," *supra* note 16, at p. 50.

n19 *Ex Parte Edward L. Engelhardt*, Appeal No. 480-01, *supra* note 1, at p. 12, JA p. 34.

The core of it is that, while there are some differences in degree between the properties of amitriptyline and imipramine, the compounds expectedly have the same type of biological activity. In the absence of evidence to show that the properties of the compounds differed in such an appreciable degree that the difference was really unexpected, we do not think that the Board erred in its determination that appellant's evidence was insufficient to rebut the prima facie case. The fact that amitriptyline and imipramine, respectively, helped some patients and not others does not appear significant. As noted by the Board, a difference in structure, although slight, would have been expected to produce some difference in activity.

In sum, we hold that the claimed invention would have been obvious to one of ordinary skill in the art. Accordingly, the decision of the Board is

AFFIRMED.

#### DISSENTBY:

BALDWIN

#### DISSENT: [\*\*26]

BALDWIN, Circuit Judge, dissenting.

The rejection by the board is flawed because it did not analyze the invention according to the requirement of 35 U.S.C. § 103. The board wrote:

The issue before us in considering the instant claims on their merits for patentability is whether the artisan having the requisite skill in the pertinent art area and a knowledge of the available prior art would have been motivated to employ amitriptyline in the treatment of human depression.

That is, whether it would have been obvious to try amitriptyline as an antidepressant. Guided by the

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disclosure of the applicant, the board pieced together information from various patents, journal articles, and papers, and concluded:

It remains our position that one having ordinary skill in this art are[sic] would have been familiar with the concept of bioisosterism and because of this knowledge would have concluded that the known compound, i.e., amitriptyline, would be *potentially* useful as an antidepressant. [Emphasis ours.]

That is, it would have been obvious to try amitriptyline as an antidepressant. Obvious-to-try is not the test for patentability [\*\*27] under 35 U.S.C. § 103. This court and its predecessor, the CCPA, have repeatedly rejected that approach. *In re Goodwin*, 576 F.2d 375, 377, 198 U.S.P.Q. (BNA) 1, 3 (CCPA 1978); *In re Antonie*, 559 F.2d 618, 620, 195 U.S.P.Q. (BNA) 6, 8 (CCPA 1977); *In re Lindell*, 55 C.C.P.A. 707, 385 F.2d 453, 455, 155 U.S.P.Q. (BNA) 521, 523 (CCPA 1967); *In re Tomlinson*, 53 C.C.P.A. 1421, 363 F.2d 928, 150 U.S.P.Q. (BNA) 623 (CCPA 1966); *In re Papesch*, 50 C.C.P.A. 1084, 315 F.2d 381, 137 U.S.P.Q. (BNA) 43 (CCPA 1963); *see also In re Grabiak*, 769 F.2d 729, 226 U.S.P.Q. (BNA) 870 (Fed. Cir. 1985).

Congress has also rejected that approach by enacting the second sentence of 35 U.S.C. § 103, which states "patentability shall not be negated by the manner in [\*\*1100] which the invention was made." The reviser's note on this sentence states "it is immaterial whether it resulted from long toil and experimentation or from a flash of genius."

The obvious-to-try analysis is an attack on the method of making an invention that specifically penalizes [\*\*28] people in areas of endeavor where advances are won only by great effort and expense. The pharmaceutical field is particularly hard hit because there is an overabundance of structures that are obvious to try. Consider, for example, the Petersen reference which the majority cites to demonstrate the possibility that a nitrogen atom may be replaced by a double-bonded carbon atom. This journal article records an attempt to find drugs useful for the treatment of endogenous psychoses, i.e., tranquilizers. The researchers tested eighteen chemicals with closely related structures. These materials were injected into mice, and compared for their ability to make the mice fall asleep. The results of these tests may be tantalizing and useful, but only as a guide for further research. I agree that, based on this information and the other references cited by the board, the researcher with ordinary skill in the art would be motivated to investigate the possibility of substituting a double-bonded

carbon atom for nitrogen. The researcher would also be motivated to test every other structural variation in Petersen, as well as a host of others. Under an obvious-to-try analysis, any of these structures [\*\*29] which ultimately is shown to be effective as an antidepressant in human beings would be unpatentable because the researcher dared to follow a logical plan.

The board and the majority also err by reading too much certainty into the teachings of the references. They have not considered the references as a whole. Friedman discusses the phenomenon that compounds with similar chemical structures sometimes behave in a similar fashion in a biological system. Once such a compound has been tested and found to have the same biological activity, it is called "bio-isosteric." n1

n1 The term "bio-isosteric" therefore is simply a conclusion drawn after testing. The label is properly limited to the system and purpose for which the compounds were tested. For example, two drugs could be bio-isosteric with respect to making mice fall asleep, and not bio-isosteric when tested at a particular dosage level for the treatment of high blood pressure in human beings. The theory of bio-isosterism as used by the board and majority is nothing more or less than an analysis of structural obviousness.

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Friedman also teaches that an isosteric compound "may have the same activity as the original, *or more usually* it may have an *antagonistic* effect." (Emphasis added.) Friedman explains that in order to predict biological activity with accuracy, one ideally should know (1) the mechanism by which the original drug acts and (2) what part of the structure of the original drug is critical to the original drug activity. n2 That reference also unequivocally states that comparisons should be made in living systems, but such information is not easily available. That reference relies on *in vitro* testing, and it specifically states that *in vitro* results may or may not correlate with clinical studies. It also clearly states that, for the purposes of its discussion, biological activities such as absorption, distribution, conjugation (detoxification), taste, odor and *side effects of drugs* will be ignored. Friedman concludes that compounds with similar structures need not be bio-isosteric.

n2 Neither this reference nor any of the others purport to disclose either piece of information.

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The Burger reference does discuss bio-isosterism and its usefulness in designing new drugs. Its evaluation of bio-isosterism as a tool for predicting drug activity is as follows:

However, if one can achieve a gradual change of biological behavior and follow it accurately at each step of minor structural alteration, one is bound to enhance one property, suppress another, and ultimately arrive at a drug suitable for therapy. Shortcuts to this disconcertingly tedious process have not been found, and this is probably responsible for the still [\*1101] prevailing opinion that new useful drugs will be discovered most easily by more or less empirical procedures.

at page 369, and

Slight stereochemical or structural changes may alter considerably the biological role

of a compound. Patient variation of at least a reasonable number of structures is still the only answer to this question.

at page 370.

The Roche reports contain background information about various pharmacological effects of amitriptyline. The information was derived from testing for its toxicity and tranquilizing effect on animals. This information would be essential to a decision [\*\*32] to clinically test the drug. It is not sufficient to show the drug would be useful for treating human beings. Congress gave pragmatic recognition to the difficulty of determining whether a new drug is useful by its enactment of the 1962 amendment to 21 U.S.C. § 321. That action was taken in response to problems caused by another tranquilizer, thalidomide.

Neither these references, nor the other references cited by the board and the majority purport to teach the worker with ordinary skill in the art that amitriptyline is a drug that is useful for treating depression in human beings. That conclusion is steps removed from the information presented by these sources. I would reverse.

LEXSEE 490 F.2D 981

**IN THE MATTER OF THE APPLICATION OF STEPHEN F. ROYKA AND  
ROBERT G. MARTIN**

**Patent Appeal No. 9092**

**UNITED STATES COURT OF CUSTOMS AND PATENT APPEALS**

**490 F.2d 981; 1974 CCPA LEXIS 200; 180 U.S.P.Q. (BNA) 580**

**February 7, 1974, Decided.**

**PRIOR HISTORY:** [\*\*1] Serial No. 648,701.

**LexisNexis(R) Headnotes**

**OPINIONBY:**

RICH

**OPINION:** [\*981]

RICH, Judge.

This appeal is from the decision of the Patent Office Board of Appeals affirming the examiner's rejection of claims 28 and 30-36 of application serial No. 648,701, filed June 26, 1967, entitled "Responsive Answer System." We reverse.

**The Invention**

The appealed claims are directed to a device in the nature of an answer sheet for use in self-instruction and testing. The answer sheet may be associated with questions or separate therefrom. the essential features of the invention are that there are printed on the answer sheet in "response areas" meaningful information in permanent printing and confusing information in printing which can be removed, as by an eraser, both being legible so that a student, seeing a choice of answers to a question, must make a selection. Having made a selection, he then applies as eraser to the selected response area and some of the information will be readily removed. What remains

advises him of the correctness or otherwise of his answer. The following figures from the drawings are illustrative:

[Graphic omitted. See illustration in original.]

Fig. 1A shows two response areas [\*\*2] to a given question before any removing action [\*982] by the student has taken place and Fig. 1B shows the permanent information remaining in each after erasure of the removable information. Of course, if the student makes an initial choice of area A, showing up "YES" or some other indication of a correct answer, he will not need to proceed further and erase the B area. In a modified form of the invention, a wrong selection, plus erasure, may expose, instead of or in addition to a statement that the answer is wrong, a number or other reference to further material which is to be studied.

A preferred method of printing the permanent meaningful information and the removable confusing information is by that type of xerography in which a fusible toner is used, the permanence of the printing depending on the extent to which the toner image is "fixed" or fused by heat. By successive printings of the two kinds of information with fixing to different degrees, one image can be made permanent and the other made subject to easy removal, both images retaining such similarity of appearance that the user of the answer sheet cannot tell them apart.

Claim 28 is the principal claim, all [\*\*3] others being dependent thereon, and reads as follows:

28. A device for selectively indicating information comprising

a support having response areas for presenting information for selection,

permanent printing indicative of meaningful information permanently fixed to said support within a response area, and

removable printing indicative of confusing information removably fixed to said support within a response area,

said meaningful and confusing information being substantially legible even when said permanent and removable printing are fixed over one another on said support,

said permanent and removable printing being substantially similar such that an observer cannot determine which information is permanent and which is removable

whereby the information within a response area is selected by attempting to remove the printing therein with the failure to remove printing identifying meaningful information.

Claims 30-36 add limitations which need not be considered except for noting that claims 33 and 34 alone specify the use of a xerographic toner, for which reason they were rejected on a different ground from the other claims.

#### The Rejection

The following references [\*\*4] were relied on:

[SEE TABLE IN ORIGINAL]

Claims 28, 30, 31, and 32 were rejected as anticipated under 35 USC 102 by Bernstein; claims 28, 31, 32, 35, and 36 were rejected as anticipated under § 102 by Reid; and claims 33 and 34 were rejected under 35 USC 103 for obviousness, on either Bernstein or Reid in view of Lein. These were the examiner's rejections and the board affirmed them, adhering to its decision on reconsideration.

Bernstein discloses an answer sheet in which printed information representing a response is "temporarily concealed from the observer" and he discloses a number of different ways of effectively concealing the response. His specification states:

The objects of the invention are accomplished by utilizing the hiding media to confuse the participant and to render the response and the hiding media indistinguishable and thus conceal the presence, absence, nature or position of the response from the participant.

This may be effectuated by careful attention being paid to a number of factors including the design, [\*983] color and position of the hiding or confusing media.

Fig. 1 of Bernstein's drawings illustrates some of his concealing means: [\*\*5]

[Graphic omitted. See illustration in original.]

The following is the written description:

Referring now to the drawing, FIG. 1 illustrates some of the many optically confusing patterns which may be positioned between the printed structure to be concealed and the point of observation. Column 11 shows the information which is to be concealed. This information is repeated in columns 12 through 16 but in each case is concealed by a pattern in accordance with the present invention. Column 12 utilizes a pattern comprising an alphabetical maze in both line and half tone screen. Column 13 utilizes a pattern comprising an absorbing field having a plurality of irregular dot-like interstices. Column 14 utilizes a pattern comprising a maze of plus signs combined with dots. Columns 15 and 16 illustrate irregular and non-repetitious patterns. Bernstein says that if at least 50% of the response is actually covered by the opaque portions of the confusion pattern, complete concealment is obtained. He also says that added means of concealment may be used, such as scoring and embossing and perforating the paper in order to scatter the light or let it shine through.

Reid is entitled [\*\*6] "Transformation Picture and Print." The invention is said to be useful for advertisements, Christmas cards, birthday cards, valentines, and the like and as a source of amusement and instruction for children. It consists of a picture or print, part of which is permanently printed and part of which is removable from the paper on which it is printed. For the latter various soluble undercoatings or inks are described. If the picture is washed with a solvent, which may be water, the removable part disappears and the pictorial and/or typographic matter changes. The invention is illustrated by a typical nineteenth century temperance propaganda piece depicting the evils of drink. In the finished picture there are three scenes from left to right: Scene 1, the innocent child leads her father home from the pub; Scene 2, Father sits slumped in the kitchen chair with his bottle beside him, the family wash hanging above his head, this picture being entitled "The Effects of Drink"; Scene 3, Mother stands in front of a sign reading "Pawn Shop." Across the bottom of the picture is a legend which says "Wash the above and see what water will do." Fig. II shows the result of washing with water: Scene [\*\*7] 1, a handsome young man and his happy daughter stroll on the street; Scene 2, Father sits erect in a well-appointed room at a cloth-covered table, apparently having a cup of tea, obviously a gentleman; Scene 3, Mother beams from the

sideline and the Pawn Shop sign has vanished. Two new subscriptions appear and the words "The" and "Drink" have disappeared, the resultant being a new picture title reading "The Beneficial Effects of Temperance." "The Beneficial" and "Temperance" were covered by some soluble opaque in the original picture. No doubt the overall effect is instruction. Perhaps there was amusement in bringing about the transformation.

Lein relates to xerography and is relied on only for its disclosure of the removability of partially fused toner and the permanence of fully fused toner.

#### OPINION

As to the § 102 anticipation rejections, it will suffice to consider independent claim 28. If it is not fully met by Reid [\*984] or Bernstein, neither are the more limited dependent claims. It is elementary that to support an anticipation rejection, all elements of the claim must be found in the reference. We do not find claim 28 anticipated by Bernstein because, as [\*\*8] we read the claim, it requires the display of legible meaningful and legible confusing information simultaneously, between which the user of the device may make a selection before he undertakes to remove any of the information from the response area selected by him. The element we find most clearly missing, contrary to the reasoning of the examiner and the board, is the legible confusing information. The Patent Office proposes to read this limitation on Bernstein's confusion patterns which are nothing but meaningless obscuring screens, conveying no information and providing the user with no basis for making a selection, as called for by claim 28. In appellants' device the legible confusing information - i.e., the wrong answers - are legible in the sense that they can be read as intelligible words, not merely a jumble of type serving to obscure the words of the wrong answers.

Appellants were fully aware of Bernstein and discussed its disclosures in their specification, distinguishing from this and other prior art, saying, in part:

The inventive concept hereof confuses not by physical blocking as taught by the prior art, but by compounding, associating (including disarranging) [\*\*9] permanent information with confusing information, usually at least some of which is similar in character to the permanent information as to render it impossible to tell which is permanent and which is removable confusing information. In the invention, generally no attempt is made to designedly physically cover the permanent information, but to confuse it beyond interpretation by the presentation of extraneous removable, confusing information.

Claims are not to be read in a vacuum and while it is true they are to be given the broadest reasonable interpretation during prosecution, their terms still have to be given the meaning called for by the specification of which they form a part. We cannot read the terms "legible" and "information" on Bernstein's confusion patterns, as did the examiner and the board. They are not "legible," as appellants use the term, and they convey no information.

As to anticipation by Reid, we find neither appellants' basic concept nor the substance of claim 28 to be disclosed. Apparently the solicitor could find little to support the rejection in Reid for all he says in his brief - so far as claim 28 is concerned - is:

Reid discloses a sheet which may [\*\*10] be used for instruction and which may have a removable design partly covering a fixed design \* \* \*. Therefore, the disclosure of the reference encompasses the arrangement wherein a removable design covers a fixed design with both designs being substantially legible.

But claim 28 does not call for an arrangement wherein a removable design covers a fixed design. It calls for response areas, which Reid does not have, containing meaningful information in permanent printing together with removable printing conveying confusing information, both legible at the same time, between which a "selection" can be made. The only choice offered to the user by Reid is to follow the instruction to wash the whole visible picture with water or other solvent, thus removing the over-printing, to discover what the permanent picture is. The Patent Office attempt to read claim 28 on this reference is a tour de force. We hold that Reid does not anticipate for failure to meet the limitations of claim 28 to "response areas," to the presentation of two categories of information (meaningful-permanent and removable-confusing) within such areas, and the possibility of selection. Anticipation requires a finding [\*\*11] that the claimed invention be disclosed. It is not enough to say that appellants' invention and the reference are [\*985] both usable for instruction and both consist of permanent and removable printings on paper, as did the solicitor.

The dependent claims rejected with claim 28, as anticipated under § 102, are not anticipated since claim 28 is not anticipated. Some of them merely add features which are disclosed by the references and some do not. Insofar as they do not, they further negative anticipation. The examiner recognized this fact as to claims 33 and 34, which are limited to xerography, and therefore did not reject them under § 102. Similarly, he did not reject claim 30 on Reid or claims 35 and 36 on Bernstein. We find that claims 35 and 36 contain limitations which additionally distinguish from Reid. We

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have already noted that Reid has no "response areas" as required by claim 28 and so Reid does not disclose the structure of claim 35 which additionally requires both the correct and incorrect answers to appear within the same response area.

As to claim 36, the examiner said it "is merely a printed matter variation of the design of the reference," Reid. This [\*\*12] is not a valid reason for rejection. Printed matter may very well constitute structural limitations upon which patentability can be predicated. We have commented on this matter in *In re Jones*, 54 CCPA 1218, 373 F.2d 1007, 153 USPQ 77 (1967); and *In re Miller*, 57 CCPA 809, 418 F.2d 1392, 164 USPQ 46 (1969), and will not repeat ourselves. The limitations of claim 36 are not remotely suggested by Reid.

There remains the § 103 rejection of claims 33 and 34. Do they, taken together with all of the limitations of claim 28 from which they depend, define obvious subject

matter? The difference between claim 28 and these two dependent claims is that they add the limitations to xerography. If Bernstein and Reid showed the claimed invention except for xerography, the addition of the Lein reference would make the subject matter of the claims obvious. But that is not the situation here. Adding the knowledge of xerographic technology to Bernstein or Reid still does not make the invention of claims 33 and 34 obvious for the same reasons we have given above in discussing anticipation. The essence of appellants' invention, as set forth in claim 28, is still missing notwithstanding the addition [\*\*13] of the Lein reference and we see nothing in the combinations of references which would have made the invention obvious to one of ordinary skill in the art at the time it was made. We will, therefore, reverse this rejection.

The decision of the board is reversed.

REVERSED



LEXSEE 424 F.2D 1382

In re David W. Wilson

No. 8271

United States Court of Customs and Patent Appeals

57 C.C.P.A. 1029; 424 F.2d 1382; 1970 CCPA LEXIS 378; 165 U.S.P.Q. (BNA)  
494

Oral argument February 4, 1970

May 7, 1970

**PRIOR HISTORY:** [\*\*\*1]

APPEALS from Patent Office, Serial No. 332,321

**DISPOSITION:**

Reversed.

**LexisNexis(R) Headnotes**

**COUNSEL:**

*Oberlin, Maky, Donnelly & Renner, William E. Thomson, Jr., John C. Oberlin*, attorneys of record, for appellant.

*Joseph Schimmel* for the Commissioner of Patents.  
*Raymond E. Martin*, of counsel.

**OPINIONBY:**

LANE

**OPINION:** [\*\*1382]

[\*1029] Before RICH, ALMOND, BALDWIN, LANE, Associate Judges, and FORD, Judge, sitting by designation.

LANE, Judge, delivered the opinion of the court.

This appeal is from the decision of the Patent Office Board of Appeals, which affirmed the rejection of claims 1-4, 8-10, and 15-21 in appellant's application serial No. 332,321, filed November 5, 1963, for "Treated Brush and Brush Treating Composition." Four other claims have been allowed. We conclude that the board's decision must be reversed.

**The Disclosure**

Appellant's disclosure discusses certain problems in the treatment of power-driven rotary brushes. According to the disclosure, it was desirable to produce [\*\*1383] a composition for treating the brush bristles, whereby the ability of the bristles to hold abrasive particles would be enhanced. It discloses that the treatment composition should have a [\*\*\*2] strength of adhesion to the brush bristles sufficiently great to prevent such composition from transferring excessively to the object being brushed; that the treatment material should wear at substantially the same rate as the brush bristles; that the material should have a high temperature softening point; and that the strength of adhesion between the treating composition and the abrasive particles must be sufficient to withstand the centrifugal force which normally would tend to throw the abrasive outwardly from the brush. The disclosure [\*1030] states that previously known brush-treating compositions did not accomplish all these objectives and

57 C.C.P.A. 1029, \*, 424 F.2d 1382, \*\*;  
1970 CCPA LEXIS 378, \*\*\*; 165 U.S.P.Q. (BNA) 494

had a tendency to dry and lose their tackiness over a period of time, thus becoming useless for holding abrasive particles on the bristles.

The disclosure states that appellant discovered that a composition having a high temperature softening point and a high degree of tackiness could be produced if a film-forming resin were blended with a tackifier resin which was incompatible with (insoluble in) the film-forming resin. The resulting composition would have two distinct phases: a continuous phase comprised of film-forming resin, [\*\*\*3] either alone or saturated with a small quantity of tackifier resin, and a dispersed phase comprised of small particles of tackifier resin. The two resins may be either completely or partially incompatible, and the disclosure states that the more insoluble the resins, the greater the tack which the composition possesses. Appellant also disclosed that certain plasticizer could be added to render the resins more incompatible, thus further increasing the tack of the composition. Finally, appellant stated that the entire composition could be dissolved in a volatile solvent to allow easy application to the brush, the solvent being one which quickly evaporates upon such application.

The specification contains a list of suitable film-forming resins, including ethyl cellulose, nitro cellulose, cellulose acetate, polyvinyl acetate and cis-polyisoprene, among other materials. A list of tackifiers is given, including certain esters of abietic acid, polyvinyl ethyl ether, coumarone indene resin and terpene resins. A list of plasticizers is also given. The specification then gives four examples showing how to combine various film-formers, tackifiers, plasticizers and solvents to obtain [\*\*\*4] brush-treating compositions of the desired characteristics, and explains how to apply them to brushes.

#### The Claims

In view of the result we reach, we find that claims 1 and 8 are representative:

1. A two-phase brush treating composition having a high softening point and sufficient tack to retain abrasive material firmly adhered to brush fill material comprising a film-forming resin and a tackifier resin which is incompatible with said film-forming resin, said two phases comprising a continuous phase formed of said film-forming resin and a dispersed phase formed of small particles of tackifier resin.

8. In combination, a rotary brush having brush fill material and a two-phase pressure sensitive adhesive brush treating composition adhered thereto having a high softening point and sufficient tack to retain abrasive material firmly adhered to such brush fill material comprising a film-forming resin and a tackifier resin

which is incompatible with said film-forming resin, said two phases [\*1031] comprising a continuous phase formed of said film-forming resin and a dispersed phase formed of small particles of tackifier resin. [\*\*1384]

The remaining claims on appeal [\*\*\*5] are narrower, containing recitations of specific resins, plasticizers, etc.

#### The Prior Art

Grantham n1 relates to coatings for film material and discloses a coating composition comprising a cellulose derivative film-former, a blending resin, a plasticizer, and an organic solvent. Grantham teaches that the blending agent and the film-former should be compatible.

n1 U.S. Pat. 3,051,670, issued August 28, 1962.

Depew n2 teaches the preparation of emulsions consisting of a continuous phase of water and a discontinuous phase of elastomer particles and particles of a volatile hydrocarbon, with vulcanizing ingredients and other additives dispersed in the hydrocarbon particles. Depew then states that where a dispersion with additional adhesive properties is desired, an adhesive, such as certain of the tackifier resins disclosed by appellants, can be added to the emulsion, and that

n2 U.S. Pat. 2,933,469, issued April 19, 1960.

[this] adhesive can be water soluble or dispersed as particles. \* \* \* The chemistry of the adhesive component is not critical to this invention. The important thing is that the deposited film shall be tacky and adhesive.

Sergi n3 relates [\*\*\*6] to adhesives suitable for installation of floor-covering products such as linoleum. Sergi's composition consists of a tackifier resin dispersed in a latex binder; the tackifier and latex must be compatible with one another, according to the Sergi disclosure.

n3 U.S. Pat. 3,015,638, issued January 2, 1962.

Vaughan n4 teaches impregnating a fibrous buffing wheel with an aqueous emulsion consisting of a tacky resin and an emulsifier or stabilizer such as glue or gum.

n4 U.S. Pat 2,890,136, issued June 9, 1959.

#### The Board

The board found the composition claims to be unpatentable over Depew, Sergi or Grantham under 35 U.S.C. 103. The board reached this conclusion after noting that each of the three references shows some of the film-formers, tackifiers, plasticizers and solvents appearing in appellant's lists. The board found that the recited limitation of incompatibility was too relative a term to distinguish over the composition of the references.

The board found that the claims to the treated brush were unpatentable, under 35 U.S.C. 103, over Vaughan in view of Sergi or Depew. Since Vaughan shows treating brushes, the board apparently considered [\*1032] [\*\*\*7] it obvious to treat brushes with composition which it thought were made obviously by Sergi or Depew.

The Board also affirmed the rejection of certain claims for being "broader than the disclosure" under 35 U.S.C. 112. The board's basis for this rejection was that the specification did not provide adequate guidelines for making a selection among the various disclosed ingredients, nor among other materials which are not disclosed but would be included by the claims.

#### Opinion

We first treat the rejection under section 112. This rejection is in effect an attack on the specification as being insufficient to teach how to practice the broad invention claimed. The rejection is therefore under the first paragraph of section 112. The board's position, as mentioned above, was that the specification did not teach how to select ingredients so that the desired incompatibility would result. We disagree with the board's position on this point. First of all, appellant provided four examples, each specifying the nature and amounts of materials to be used. Secondly, the record indicates that it involves only routine experimentation to find out which resins are incompatible. The examiner admitted [\*\*\*8] as much when, [\*\*1385] with regard to obviousness, he said "selecting the proper tackifier and film-forming resin from those listed in the references to form an emulsion or two-phase composition would be within the expected skill of the art and would merely involve routine experimentation." We conclude that appellant has provided a sufficient specification to support the claims here in issue.

[1] Turning to the rejection of the claims for obviousness, we again disagree with the board's position. The board has disregarded the term "incompatible," and used in the claims, because it is "too relative" to distinguish over the compositions of the references. Appellant contends this limitation is essential in defining his invention. There has been no rejection here for indefiniteness, under the second paragraph of section 112. Rather than reject the claims as indefinite, the board chose to ignore the language it considered indefinite, and proceeded as though that language were not in the claims. The board said, in effect, that since we do not know what "incompatible" means, and the rest of the claim defines obvious subject matter, there is no basis for concluding unobviousness. [\*\*\*9] This reasoning is incorrect. All words in a claim must be considered in judging the patentability of that claim against the prior art. If no reasonably definite meaning can be ascribed to certain terms in the claim, the subject matter does not become obvious - the claim becomes indefinite. In the present case, we think the [\*1033] term "incompatible" is defined with reasonable definiteness in the specification. While it is true that the word is not perfectly precise, under the circumstances of the present case there appears to be no other way for appellant to describe his discovery. In any event, the ignoring of this term by the board renders its conclusion of obviousness unsupported. None of the references discloses a two-phase composition of incompatible resins or suggests that such a composition would have the properties disclosed by appellant. Grantham and Sergi both expressly teach that the components of their compositions should be compatible. Neither Vaughan nor Depew uses a resin as the continuous phase. While Depew states, as quoted above, that the adhesive material may be dispersed as particles in the continuous phase, and hence be incompatible with the continuous [\*\*\*10] phase material, it cannot be ignored that Depew's continuous phase is of water, not a film-forming resin as recited in appellant's claims. Furthermore, there is no suggestion in Depew or Vaughan that there are advantages in using an adhesive which is insoluble in the aqueous phase. There is nothing of record, therefore, from which we can properly conclude that the subject matter of appellant's claims would have been obvious at the time of his invention. The decision of the board must accordingly be reversed.